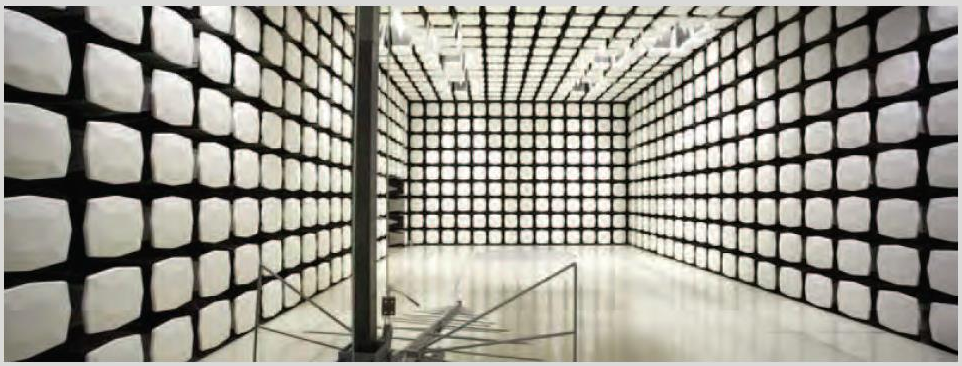
DENSO International America, Inc.

B2NA0

FCC 15.209:2022, HKCA 1035

Inductive

Report: ENTI0013 Rev. 1, Issue Date: March 14, 2022



ACCREDITED
CERT #3310.04

CERTIFICATE OF TEST

Last Date of Test: February 4, 2022
DENSO International America, Inc.

EUT: B2NA0

Standards

Specification	Method
FCC 15.209:2021, HKCA 1035	ANSI C63.10:2013

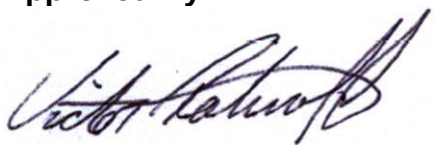
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
6.4	Field Strength of Fundamental	Yes	Pass	
6.4, 6.5	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	FCC 15.209:2020 changed to FCC 15.209:2021	2022-03-14	1
	Removed row with FCC 15.209:2022 listed	2022-03-14	2
	Updated missing fields in configurations	2022-03-14	12-20
	Changed the last date for FF testing from 12/29 to the latest date shown in the FF data which is 12/30.	2022-03-14	21
	All serial number entries changed from "none" to "See Configuration"	2022-03-14	22-39, 41-65
	Changed "Leveraging.." verbiage to "Data presented are the worst case modes as determined during pre compliance testing"	2022-03-14	22-39, 41-65
	Updated frequency range to (9 kHz to 30 MHz)	2022-03-14	40-64
	Reordered tabs to be in ascending order of frequency range.	2022-03-14	53-54
	More detailed information added to the product description	2022-03-14	10
	Updated FCC 15.209:2021, HKCA 1035 to FCC 15.209:2022, HKCA 1035	2022-03-14	1, 2
	Updated Antenna information with newest version of table	2022-03-14	11

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

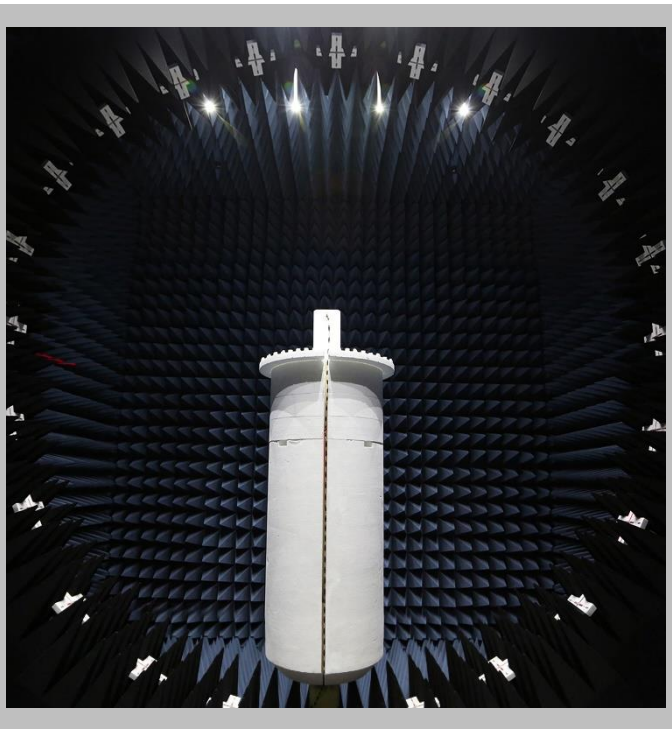
SCOPE

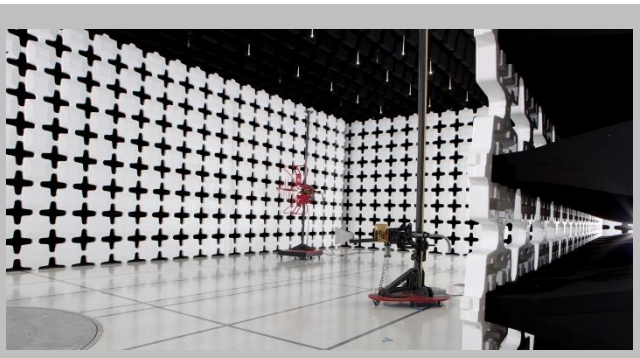
For details on the Scopes of our Accreditations, please visit:

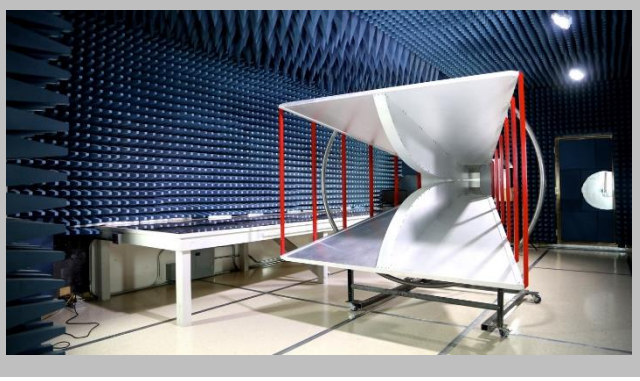
California Minnesota Oregon Texas Washington

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

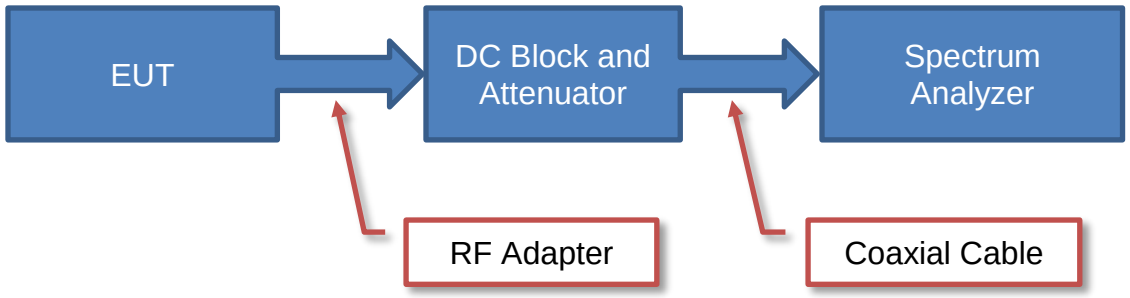
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

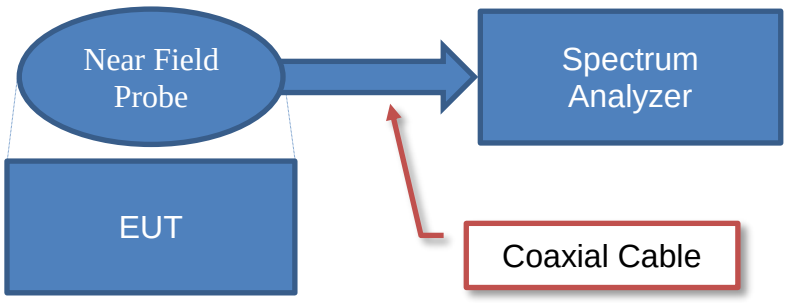
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

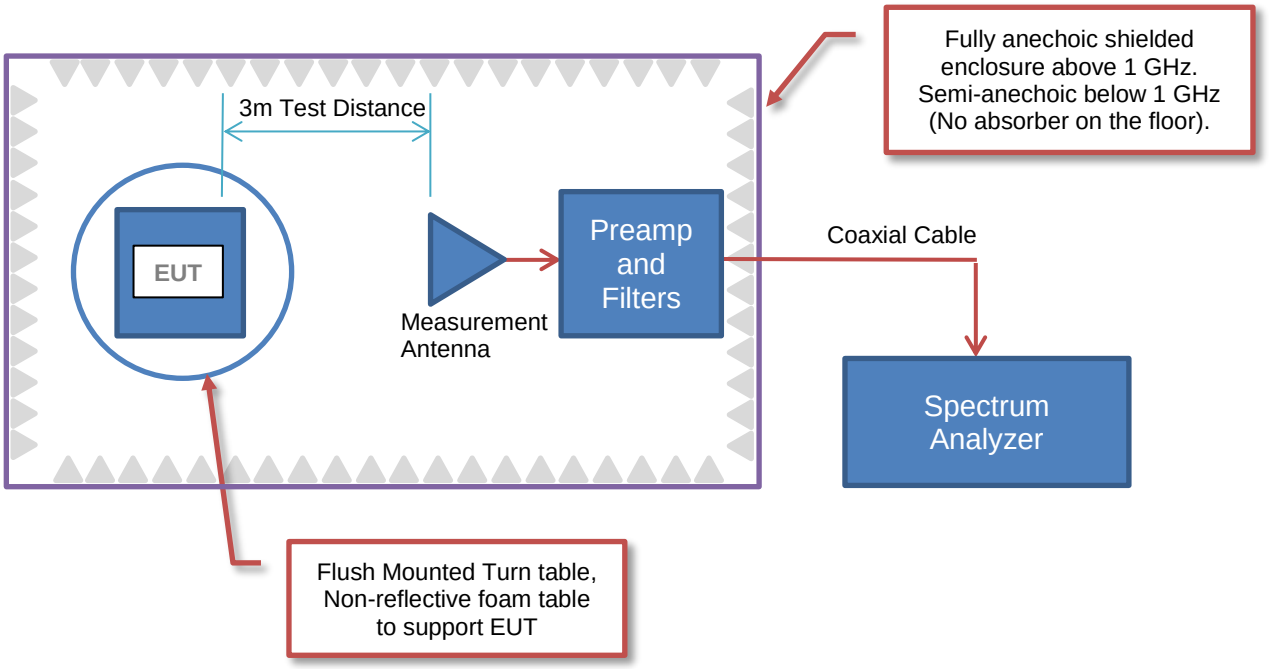


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)		Factor: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

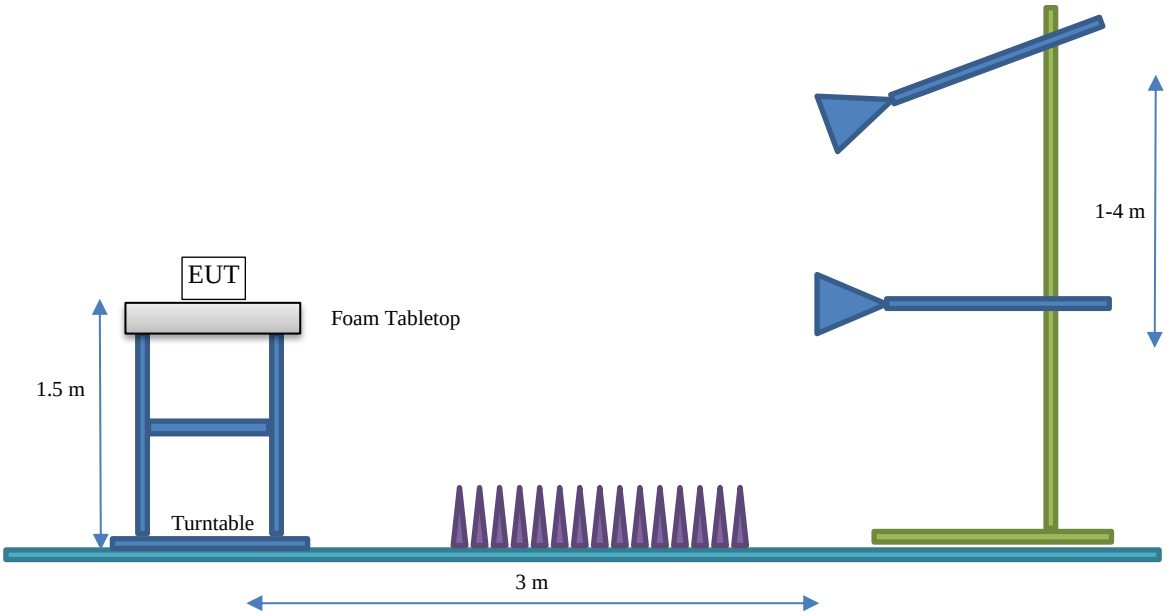
Conducted Emissions:

Measured Level (Amplitude)		Factor: Transducer Factor		Factor: Cable Factor		External Attenuation		Adjusted Level
26.7	+	0.3	+	0.1	+	20.0	=	**47.1**

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	DENSO International America, Inc.
Address:	24777 Denso Drive
City, State, Zip:	Southfield, MI 48033
Test Requested By:	Jason Summerford
EUT:	B2NA0
First Date of Test:	December 29, 2021
Last Date of Test:	February 4, 2022
Receipt Date of Samples:	December 29, 2021
Equipment Design Stage:	Production Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Smart key system for vehicles using a 125 kHz radio. PEPS: Passive Entry Passive Start System (LF transmitter and transceiver).

Radio Specification:

[Transmitter part]

Radio Type:	LF Transmitter
Frequency of Operation:	125 kHz
Oscillation circuit:	Crystal
Oscillator frequency:	16 MHz
Modulation:	OOK / ASK
LF Antenna:	Type1: Rocker Driver Antenna Rocker Passenger Antenna Trunk Antenna Bracket Antenna Type2: Rear(Front) Bumper/Frunk Antenna Interior Antenna
LF/IMMO Combo Antenna:	Type3: IMMO Combo Antenna
Antenna Specification:	Ferrite antenna coil

[Receiver part]

Frequency of Operation:	125 kHz
Oscillator frequency:	16 MHz
Type of receiving system:	Direct conversion
Antenna Specification:	Ferrite antenna coil

Client attestation:

The manufacturer declares under its sole responsibility the antennas listed are compatible with the BCM, model B2NA0. Tested configurations are the worst-case scenarios, previously studied in pre compliance testing.

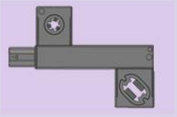
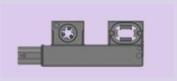
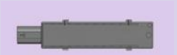
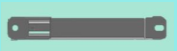
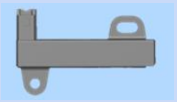
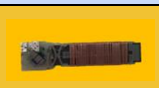
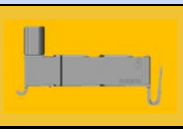
Testing Objective:

To demonstrate compliance of the inductive portion of the device to FCC Part 15.209 specifications.

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA INFORMATION

Internal	Appearance	Mount on Metal	Antenna name	Core dimension	Inductance	Impedance
		Steel	Trunk Antenna	62.0 x 8.0 x 3.2 [mm]	495 [µH] ±15%	20 [Ω] (Max.)
			Rocker Driver Antenna			
			Rocker Passenger Antenna			
		Aluminum*	Bracket Antenna			
		No	Rear (front) Bumper Frunk Antenna	59.7 x 12.0 x 2.5 [mm]	495 [µH] ±15%	20 [Ω] (Max.)
		No	Combo (IMMO/LF) Antenna	62.0 x 8.0 x 5.0 [mm]	462 [µH] ±1%	2 [Ω] ±1 [Ω]
		No	Interior Antenna	59.7 x 12.0 x 2.5 [mm]	495 [µH] ±15%	20 [Ω] (Max.)

No adjustable power settings were provided. The EUT was tested using power settings pre-defined by the manufacturer.

CONFIGURATIONS

Configuration ENTI0013- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rocker Passenger Antenna - Steel Plate	DENSO International America, Inc.	Rocker Passenger Antenna - Steel Plate	#02
Bracket Antenna - Steel Plate	DENSO International America, Inc.	Bracket Antenna - Steel Plate	#05
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/1_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT2/2_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/7_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT8/8_R)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Rocker Passenger Antenna - Steel Plate	DENSO International America, Inc.	Rocker Passenger Antenna - Steel Plate	#02
Bracket Antenna - Steel Plate	DENSO International America, Inc.	Bracket Antenna - Steel Plate	#05

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/1_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT2/2_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/7_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT8/8_R)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 5

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01
Bracket Antenna - Steel Plate	DENSO International America, Inc.	Bracket Antenna - Steel Plate	#05

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rocker Passenger Antenna - Steel Plate	DENSO International America, Inc.	Rocker Passenger Antenna - Steel Plate	#02
VASS Switch Box	DENSO International America, Inc.	BI001	J2

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 6

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 8

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 9

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-001
Transponder	DENSO International America, Inc.	PCF7939VA	#M1

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
Interior Antenna	DENSO International America, Inc.	Interior Antenna	#03
Trunk Antenna - Steel Plate	DENSO International America, Inc.	Trunk Antenna - Steel Plate	#06
Rear Bumper Frunk Antenna	DENSO International America, Inc.	Rear (front) Bumper Frunk Antenna	#01
VASS Switch Box	DENSO International America, Inc.	BI001	J2
Driver Antenna - Steel Plate	DENSO International America, Inc.	Driver Antenna - Steel Plate	#07

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
Cable Harness - Switch Box	No	1.5m	No	BCM Module 125 kHz	VASS Switch Box
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna

CONFIGURATIONS

Configuration ENTI0013- 10

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Combo (IMMO/LF) Antenna	DENSO International America, Inc.	Combo (IMMO/LF) Antenna	#01
Bracket Antenna - Aluminum Plate	DENSO International America, Inc.	Bracket Antenna - Aluminum Plate	#03
BCM Module 125 kHz	DENSO International America, Inc.	B2NA0	BCM2-EL-002

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Antenna Cable (ANT3/4)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT5/6)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/8)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT9/10)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (IMMO Hi/Lo)	No	1.0m	No	BCM Module 125 kHz	Antenna
DC Cable	No	2.0m	No	BCM Module 125 kHz	DC Power
Antenna Cable (ANT1/2)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT1/1_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT2/2_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT7/7_R)	No	1.0m	No	BCM Module 125 kHz	Antenna
Antenna Cable (ANT8/8_R)	No	1.0m	No	BCM Module 125 kHz	Antenna

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-12-30	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-02-04	Spurious Radiated Emission	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

FIELD STRENGTH OF FUNDAMENTAL - HALF BRIDGE, SINGLE CH

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half Bridge. Test Mode: Single Ch PEPS on BCM Antenna Pins 01&01R.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

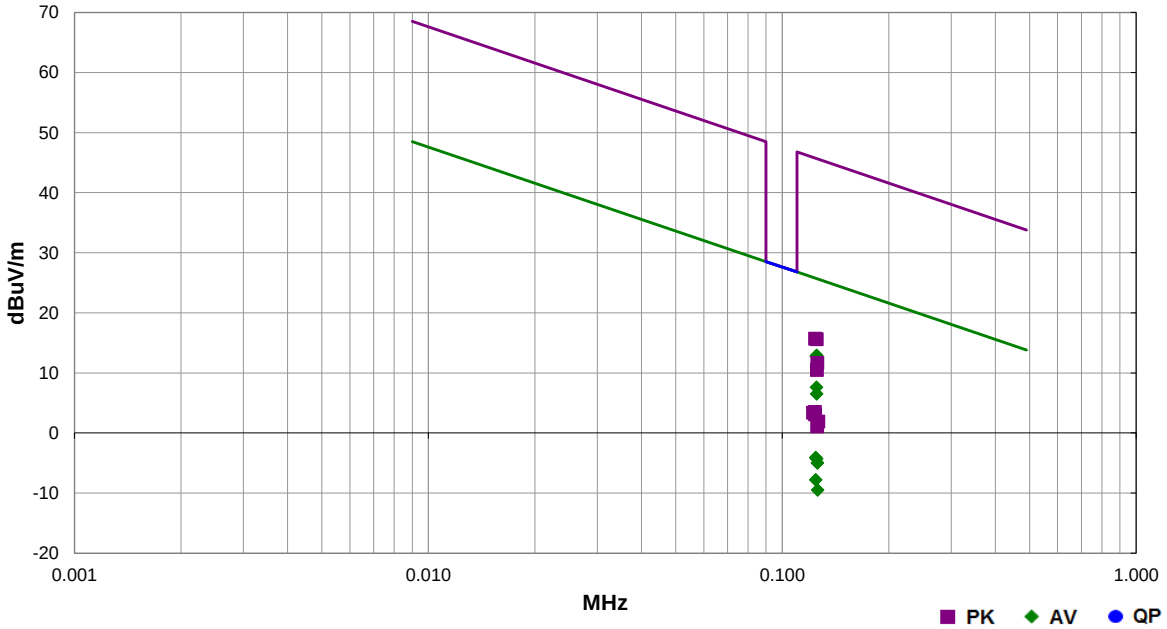
FIELD STRENGTH OF FUNDAMENTAL - HALF BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-29		
Project:	None	**Temperature:**	19.2 °C		
Job Site:	OC08	**Humidity:**	45.2% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	2				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Single Ch PEPS on BCM Antenna Pins 01&01R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	7	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	61.7	10.3	1.0	3.0	10.0	0.0	Perp to EUT	AV	-59.1	12.9	25.7	-12.8	Tx 125 kHz, EUT On Side
0.125	61.6	10.3	1.0	102.0	10.0	0.0	Perp to EUT	AV	-59.1	12.8	25.7	-12.9	Tx 125 kHz, EUT Horz
0.125	56.4	10.3	1.0	21.0	10.0	0.0	Par to EUT	AV	-59.1	7.6	25.7	-18.1	Tx 125 kHz, EUT Horz
0.125	55.3	10.3	1.0	292.0	10.0	0.0	Par to EUT	AV	-59.1	6.5	25.7	-19.2	Tx 125 kHz, EUT On Side
0.124	44.7	10.3	1.0	24.0	10.0	0.0	Par to GND	AV	-59.1	-4.1	25.7	-29.8	Tx 125 kHz, EUT Horz
0.125	44.5	10.3	1.0	355.0	10.0	0.0	Par to EUT	AV	-59.1	-4.3	25.7	-30.0	Tx 125 kHz, EUT Vert
0.124	64.5	10.3	1.0	102.0	10.0	0.0	Perp to EUT	PK	-59.1	15.7	45.8	-30.1	Tx 125 kHz, EUT Horz
0.125	64.4	10.3	1.0	3.0	10.0	0.0	Perp to EUT	PK	-59.1	15.6	45.7	-30.1	Tx 125 kHz, EUT On Side
0.126	43.8	10.3	1.0	309.0	10.0	0.0	Par to GND	AV	-59.1	-5.0	25.6	-30.6	Tx 125 kHz, EUT On Side
0.124	41.0	10.3	1.0	225.0	10.0	0.0	Perp to EUT	AV	-59.1	-7.8	25.7	-33.5	Tx 125 kHz, EUT Vert
0.126	60.5	10.3	1.0	21.0	10.0	0.0	Par to EUT	PK	-59.1	11.7	45.6	-33.9	Tx 125 kHz, EUT Horz
0.126	39.3	10.3	1.0	283.0	10.0	0.0	Par to GND	AV	-59.1	-9.5	25.6	-35.1	Tx 125 kHz, EUT Vert
0.125	59.3	10.3	1.0	292.0	10.0	0.0	Par to EUT	PK	-59.1	10.5	45.7	-35.2	Tx 125 kHz, EUT On Side
0.124	52.3	10.3	1.0	24.0	10.0	0.0	Par to GND	PK	-59.1	3.5	45.8	-42.3	Tx 125 kHz, EUT Horz
0.122	52.2	10.3	1.0	355.0	10.0	0.0	Par to EUT	PK	-59.1	3.4	45.9	-42.5	Tx 125 kHz, EUT Vert
0.124	51.9	10.3	1.0	309.0	10.0	0.0	Par to GND	PK	-59.1	3.1	45.8	-42.7	Tx 125 kHz, EUT On Side
0.126	50.7	10.3	1.0	225.0	10.0	0.0	Perp to EUT	PK	-59.1	1.9	45.6	-43.7	Tx 125 kHz, EUT Vert
0.126	49.9	10.3	1.0	283.0	10.0	0.0	Par to GND	PK	-59.1	1.1	45.7	-44.6	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - HALF BRIDGE, DUAL CH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

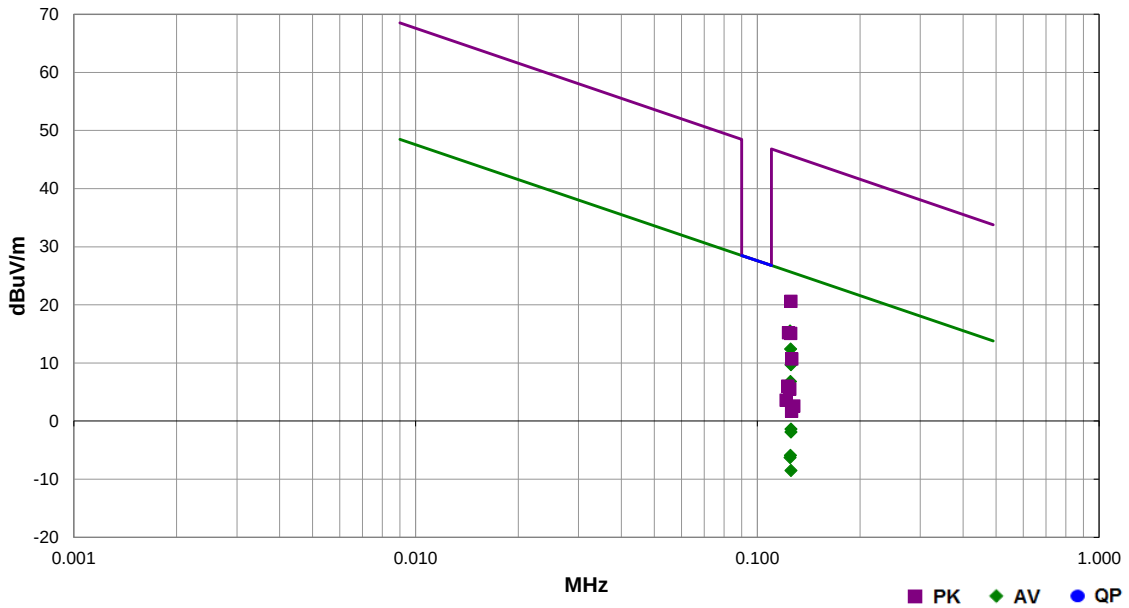
FIELD STRENGTH OF FUNDAMENTAL - HALF BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-29		
Project:	None	**Temperature:**	19.2 °C		
Job Site:	OC08	**Humidity:**	45.2% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	3				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	6	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	64.3	10.3	1.0	89.0	10.0	0.0	Perp to EUT	AV	-59.1	15.5	25.7	-10.2	Tx 125 kHz, EUT Horz
0.125	61.2	10.3	1.0	0.0	10.0	0.0	Perp to EUT	AV	-59.1	12.4	25.7	-13.3	Tx 125 kHz, EUT On Side
0.126	58.5	10.3	1.0	0.0	10.0	0.0	Par to EUT	AV	-59.1	9.7	25.7	-16.0	Tx 125 kHz, EUT Horz
0.125	55.6	10.3	1.0	93.0	10.0	0.0	Par to EUT	AV	-59.1	6.8	25.7	-18.9	Tx 125 kHz, EUT On Side
0.125	69.4	10.3	1.0	89.0	10.0	0.0	Perp to EUT	PK	-59.1	20.6	45.7	-25.1	Tx 125 kHz, EUT Horz
0.126	47.4	10.3	1.0	341.0	10.0	0.0	Par to EUT	AV	-59.1	-1.4	25.7	-27.1	Tx 125 kHz, EUT Vert
0.126	46.9	10.3	1.0	28.0	10.0	0.0	Par to GND	AV	-59.1	-1.9	25.6	-27.5	Tx 125 kHz, EUT Horz
0.123	64.0	10.3	1.0	0.0	10.0	0.0	Par to EUT	PK	-59.1	15.2	45.8	-30.6	Tx 125 kHz, EUT Horz
0.125	63.9	10.3	1.0	0.0	10.0	0.0	Perp to EUT	PK	-59.1	15.1	45.7	-30.6	Tx 125 kHz, EUT On Side
0.125	42.9	10.3	1.0	133.0	10.0	0.0	Par to GND	AV	-59.1	-5.9	25.7	-31.6	Tx 125 kHz, EUT On Side
0.125	42.5	10.3	1.0	251.0	10.0	0.0	Par to EUT	AV	-59.1	-6.3	25.7	-32.0	Tx 125 kHz, EUT Vert
0.125	40.3	10.3	1.0	74.0	10.0	0.0	Perp to GND	AV	-59.1	-8.5	25.7	-34.2	Tx 125 kHz, EUT Vert
0.126	59.5	10.3	1.0	93.0	10.0	0.0	Par to EUT	PK	-59.1	10.7	45.6	-34.9	Tx 125 kHz, EUT On Side
0.123	54.8	10.3	1.0	341.0	10.0	0.0	Par to EUT	PK	-59.1	6.0	45.8	-39.8	Tx 125 kHz, EUT Vert
0.124	54.3	10.3	1.0	28.0	10.0	0.0	Par to GND	PK	-59.1	5.5	45.7	-40.2	Tx 125 kHz, EUT Horz
0.121	52.4	10.3	1.0	133.0	10.0	0.0	Par to GND	PK	-59.1	3.6	45.9	-42.3	Tx 125 kHz, EUT On Side
0.128	51.4	10.3	1.0	251.0	10.0	0.0	Par to EUT	PK	-59.1	2.6	45.5	-42.9	Tx 125 kHz, EUT Vert
0.126	50.5	10.3	1.0	74.0	10.0	0.0	Perp to GND	PK	-59.1	1.7	45.6	-43.9	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - ROUND ROBIN

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half-Bridge. Test Mode: Round Robin

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 10

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

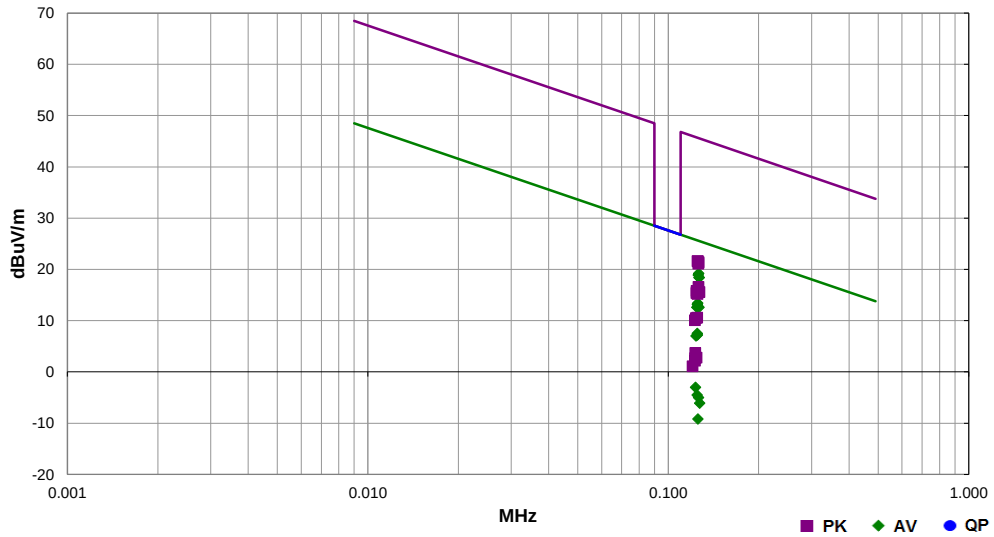
FIELD STRENGTH OF FUNDAMENTAL - ROUND ROBIN

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-07		
Project:	None	**Temperature:**	18 °C		
Job Site:	OC08	**Humidity:**	52.2% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	10				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half-Bridge. Test Mode: Round Robin				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. During Round Robin mode, each antenna pin will transmit if an antenna is connected. Hence only 1 antenna was terminated during field strength testing in order to determine worst case pin. Please see comments column below for EUT orientation and Pin number to which the antenna was connected				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	15	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.126	68.0	10.3	1.0	286.0	10.0	0.0	Perp to EUT	AV	-59.1	19.2	25.6	-6.4	Tx 125 kHz, EUT Horz, Pin IMMO Hi/Lo
0.126	67.7	10.3	1.0	265.0	10.0	0.0	Perp to EUT	AV	-59.1	18.9	25.6	-6.7	Tx 125 kHz, EUT Horz, Pin 03&04
0.127	67.2	10.3	1.0	87.0	10.0	0.0	Perp to EUT	AV	-59.1	18.4	25.6	-7.2	Tx 125 kHz, EUT Horz, Pin 05&06
0.127	67.2	10.3	1.0	81.0	10.0	0.0	Perp to EUT	AV	-59.1	18.4	25.6	-7.2	Tx 125 kHz, EUT Horz, Pin 09&10
0.125	62.2	10.3	1.0	95.0	10.0	0.0	Perp to EUT	AV	-59.1	13.4	25.7	-12.3	Tx 125 kHz, EUT Horz, Pin 02&02R
0.125	62.0	10.3	1.0	100.0	10.0	0.0	Perp to EUT	AV	-59.1	13.2	25.7	-12.5	Tx 125 kHz, EUT Horz, Pin 07&07R
0.125	61.6	10.3	1.0	87.0	10.0	0.0	Perp to EUT	AV	-59.1	12.8	25.7	-12.9	Tx 125 kHz, EUT Horz, Pin 01&01R
0.127	61.4	10.3	1.0	86.0	10.0	0.0	Perp to EUT	AV	-59.1	12.6	25.6	-13.0	Tx 125 kHz, EUT Horz, Pin 08&08R
0.125	61.4	10.3	1.0	356.0	10.0	0.0	Perp to EUT	AV	-59.1	12.6	25.7	-13.1	Tx 125 kHz, EUT on Side, Pin 01&01R
0.125	56.3	10.3	1.0	17.0	10.0	0.0	Par to EUT	AV	-59.1	7.5	25.7	-18.2	Tx 125 kHz, EUT Horz, Pin 02&02R
0.125	56.0	10.3	1.0	9.0	10.0	0.0	Par to EUT	AV	-59.1	7.2	25.7	-18.5	Tx 125 kHz, EUT Horz, Pin 01&01R
0.124	55.8	10.3	1.0	88.0	10.0	0.0	Par to EUT	AV	-59.1	7.0	25.8	-18.8	Tx 125 kHz, EUT on Side, Pin 01&01R
0.125	70.4	10.3	1.0	87.0	10.0	0.0	Perp to EUT	PK	-59.1	21.6	45.7	-24.1	Tx 125 kHz, EUT Horz, Pin 05&06
0.125	70.4	10.3	1.0	286.0	10.0	0.0	Perp to EUT	PK	-59.1	21.6	45.7	-24.1	Tx 125 kHz, EUT Horz, Pin IMMO Hi/Lo
0.126	70.2	10.3	1.0	81.0	10.0	0.0	Perp to EUT	PK	-59.1	21.4	45.6	-24.2	Tx 125 kHz, EUT Horz, Pin 09&10
0.126	69.9	10.3	1.0	265.0	10.0	0.0	Perp to EUT	PK	-59.1	21.1	45.6	-24.5	Tx 125 kHz, EUT Horz, Pin 03&04
0.123	45.8	10.3	1.0	333.0	10.0	0.0	Par to EUT	AV	-59.1	-3.0	25.8	-28.8	Tx 125 kHz, EUT Vert, Pin 01&01R
0.126	65.4	10.3	1.0	86.0	10.0	0.0	Perp to EUT	PK	-59.1	16.6	45.6	-29.0	Tx 125 kHz, EUT Horz, Pin 08&08R
0.127	64.4	10.3	1.0	95.0	10.0	0.0	Perp to EUT	PK	-59.1	15.6	45.5	-29.9	Tx 125 kHz, EUT Horz, Pin 02&02R
0.124	64.6	10.3	1.0	100.0	10.0	0.0	Perp to EUT	PK	-59.1	15.8	45.7	-29.9	Tx 125 kHz, EUT Horz, Pin 07&07R
0.125	44.3	10.3	1.0	117.0	10.0	0.0	Par to GND	AV	-59.1	-4.5	25.7	-30.2	Tx 125 kHz, EUT on Side, Pin 01&01R
0.124	64.2	10.3	1.0	87.0	10.0	0.0	Perp to EUT	PK	-59.1	15.4	45.8	-30.4	Tx 125 kHz, EUT Horz, Pin 01&01R
0.125	64.0	10.3	1.0	356.0	10.0	0.0	Perp to EUT	PK	-59.1	15.2	45.7	-30.5	Tx 125 kHz, EUT on Side, Pin 01&01R
0.126	43.8	10.3	1.0	17.0	10.0	0.0	Par to GND	AV	-59.1	-5.0	25.6	-30.6	Tx 125 kHz, EUT Horz, Pin 01&01R
0.127	42.7	10.3	1.0	77.0	10.0	0.0	Perp to EUT	AV	-59.1	-6.1	25.5	-31.6	Tx 125 kHz, EUT Vert, Pin 01&01R
0.126	39.6	10.3	1.0	12.0	10.0	0.0	Par to GND	AV	-59.1	-9.2	25.6	-34.8	Tx 125 kHz, EUT Vert, Pin 01&01R
0.125	59.4	10.3	1.0	17.0	10.0	0.0	Par to EUT	PK	-59.1	10.6	45.7	-35.1	Tx 125 kHz, EUT Horz, Pin 02&02R
0.124	59.3	10.3	1.0	88.0	10.0	0.0	Par to EUT	PK	-59.1	10.5	45.8	-35.3	Tx 125 kHz, EUT on Side, Pin 01&01R
0.123	58.9	10.3	1.0	9.0	10.0	0.0	Par to EUT	PK	-59.1	10.1	45.8	-35.7	Tx 125 kHz, EUT Horz, Pin 01&01R
0.123	52.5	10.3	1.0	333.0	10.0	0.0	Par to EUT	PK	-59.1	3.7	45.8	-42.1	Tx 125 kHz, EUT Vert, Pin 01&01R
0.124	51.6	10.3	1.0	117.0	10.0	0.0	Par to GND	PK	-59.1	2.8	45.7	-42.9	Tx 125 kHz, EUT on Side, Pin 01&01R
0.123	51.5	10.3	1.0	77.0	10.0	0.0	Perp to EUT	PK	-59.1	2.7	45.8	-43.1	Tx 125 kHz, EUT Vert, Pin 01&01R
0.123	51.0	10.3	1.0	17.0	10.0	0.0	Par to GND	PK	-59.1	2.2	45.9	-43.7	Tx 125 kHz, EUT Horz, Pin 01&01R
0.120	49.9	10.3	1.0	12.0	10.0	0.0	Par to GND	PK	-59.1	1.1	46.0	-44.9	Tx 125 kHz, EUT Vert, Pin 01&01R

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, SINGLE CH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna pins 05&06

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 6

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

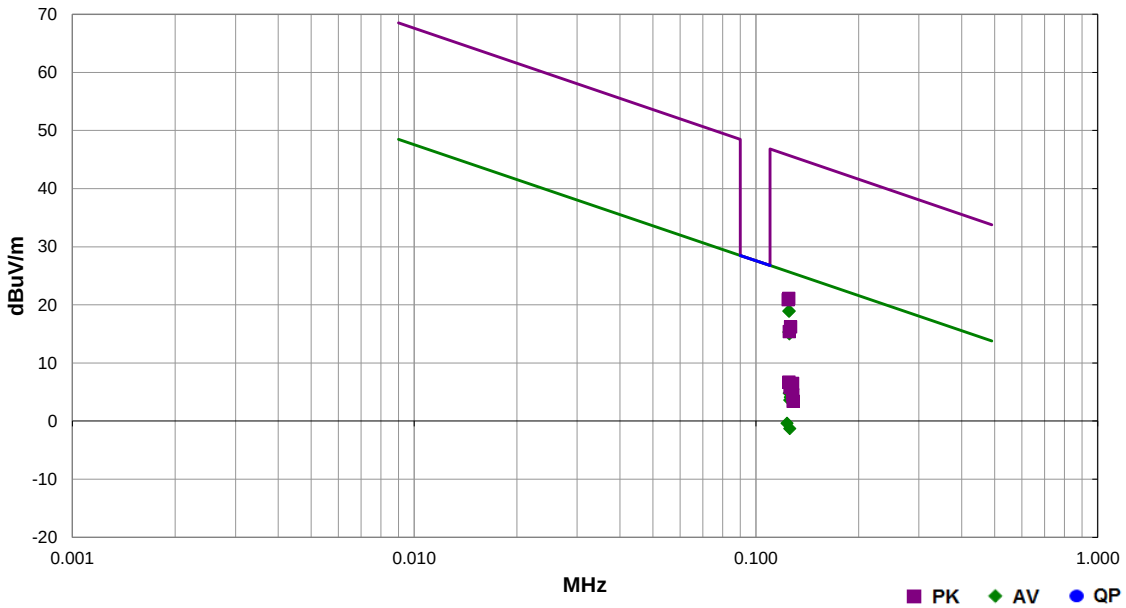
FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-30		
Project:	None	**Temperature:**	18.9 °C		
Job Site:	OC08	**Humidity:**	54.5% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	6				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna pins 05&06				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	9	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	67.7	10.3	1.0	100.0	10.0	0.0	Perp to EUT	AV	-59.1	18.9	25.7	-6.8	Tx 125 kHz, EUT Horz
0.125	67.7	10.3	1.0	7.0	10.0	0.0	Perp to EUT	AV	-59.1	18.9	25.7	-6.8	Tx 125 kHz, EUT on Side
0.125	64.1	10.3	1.0	94.0	10.0	0.0	Par to EUT	AV	-59.1	15.3	25.7	-10.4	Tx 125 kHz, EUT Vert
0.125	63.8	10.3	1.0	11.0	10.0	0.0	Par to EUT	AV	-59.1	15.0	25.7	-10.7	Tx 125 kHz, EUT Horz
0.125	53.6	10.3	1.0	11.0	10.0	0.0	Par to EUT	AV	-59.1	4.8	25.7	-20.9	Tx 125 kHz, EUT on Side
0.126	52.9	10.3	1.0	205.0	10.0	0.0	Par to GND	AV	-59.1	4.1	25.6	-21.5	Tx 125 kHz, EUT Horz
0.126	52.4	10.3	1.0	282.0	10.0	0.0	Par to GND	AV	-59.1	3.6	25.6	-22.0	Tx 125 kHz, EUT Vert
0.125	69.9	10.3	1.0	83.0	10.0	0.0	Perp to EUT	PK	-59.1	21.1	45.7	-24.6	Tx 125 kHz, EUT Horz
0.124	69.7	10.3	1.0	-1.0	10.0	0.0	Perp to EUT	PK	-59.1	20.9	45.7	-24.8	Tx 125 kHz, EUT Vert
0.123	48.4	10.3	1.0	289.0	10.0	0.0	Perp to EUT	AV	-59.1	-0.4	25.8	-26.2	Tx 125 kHz, EUT Vert
0.126	47.5	10.3	1.0	65.0	10.0	0.0	Par to GND	AV	-59.1	-1.3	25.6	-26.9	Tx 125 kHz, EUT on Side
0.126	65.0	10.3	1.0	94.0	10.0	0.0	Par to EUT	PK	-59.1	16.2	45.6	-29.4	Tx 125 kHz, EUT Vert
0.125	64.2	10.3	1.0	11.0	10.0	0.0	Par to EUT	PK	-59.1	15.4	45.7	-30.3	Tx 125 kHz, EUT Horz
0.128	55.3	10.3	1.0	205.0	10.0	0.0	Par to GND	PK	-59.1	6.5	45.5	-39.0	Tx 125 kHz, EUT Horz
0.125	55.5	10.3	1.0	11.0	10.0	0.0	Par to EUT	PK	-59.1	6.7	45.7	-39.0	Tx 125 kHz, EUT on Side
0.126	54.6	10.3	1.0	282.0	10.0	0.0	Par to GND	PK	-59.1	5.8	45.6	-39.8	Tx 125 kHz, EUT Vert
0.128	53.3	10.3	1.0	252.0	10.0	0.0	Perp to EUT	PK	-59.1	4.5	45.5	-41.0	Tx 125 kHz, EUT on Side
0.128	52.2	10.3	1.0	65.0	10.0	0.0	Par to GND	PK	-59.1	3.4	45.5	-42.1	Tx 125 kHz, EUT on Side

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, SINGLE CH PEPS IMMO

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins IMMO Hi/Lo.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, SINGLE CH PEPS IMMO

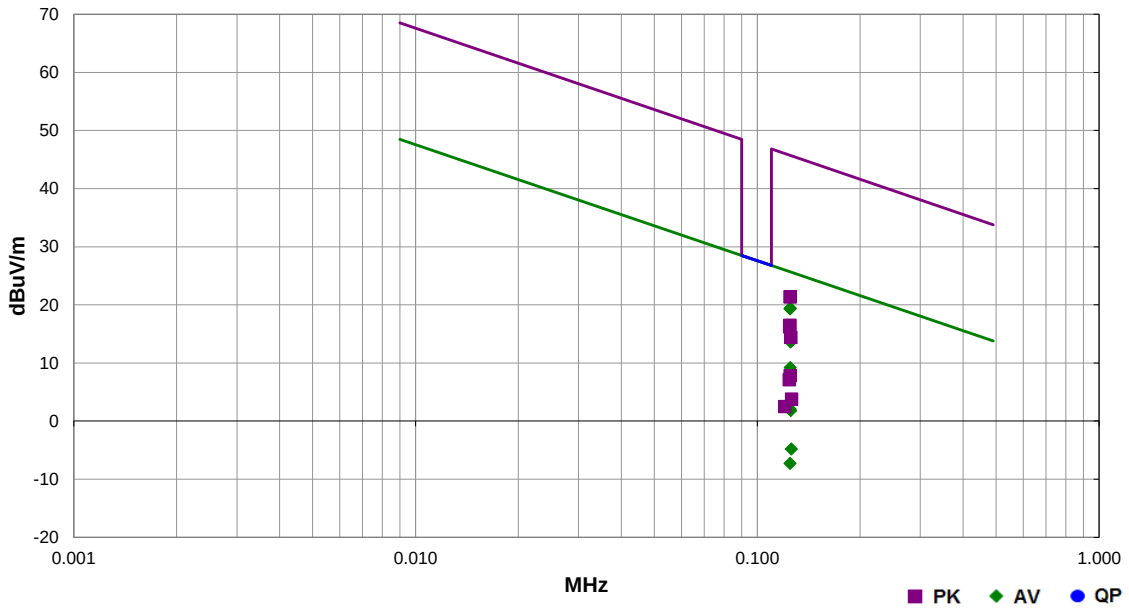
element

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-29		
Project:	None	**Temperature:**	19.2 °C		
Job Site:	OC08	**Humidity:**	45.2% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	4				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	5	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	68.2	10.3	1.0	1.0	10.0	0.0	Perp to EUT	AV	-59.1	19.4	25.7	-6.3	Tx 125 kHz, EUT Horz
0.125	68.1	10.3	1.0	0.0	10.0	0.0	Perp to EUT	AV	-59.1	19.3	25.7	-6.4	Tx 125 kHz, EUT On Side
0.125	62.5	10.3	1.0	90.0	10.0	0.0	Par to EUT	AV	-59.1	13.7	25.7	-12.0	Tx 125 kHz, EUT Horz
0.125	62.4	10.3	1.0	95.0	10.0	0.0	Par to EUT	AV	-59.1	13.6	25.7	-12.1	Tx 125 kHz, EUT On Side
0.125	58.0	10.3	1.0	350.0	10.0	0.0	Par to EUT	AV	-59.1	9.2	25.7	-16.5	Tx 125 kHz, EUT Vert
0.125	50.9	10.3	1.0	281.0	10.0	0.0	Par to GND	AV	-59.1	2.1	25.7	-23.6	Tx 125 kHz, EUT Horz
0.125	50.6	10.3	1.0	291.0	10.0	0.0	Par to GND	AV	-59.1	1.8	25.7	-23.9	Tx 125 kHz, EUT On Side
0.125	70.2	10.3	1.0	1.0	10.0	0.0	Perp to EUT	PK	-59.1	21.4	45.7	-24.3	Tx 125 kHz, EUT Horz
0.125	70.2	10.3	1.0	0.0	10.0	0.0	Perp to EUT	PK	-59.1	21.4	45.7	-24.3	Tx 125 kHz, EUT On Side
0.125	65.3	10.3	1.0	90.0	10.0	0.0	Par to EUT	PK	-59.1	16.5	45.7	-29.2	Tx 125 kHz, EUT Horz
0.124	65.0	10.3	1.0	95.0	10.0	0.0	Par to EUT	PK	-59.1	16.2	45.7	-29.5	Tx 125 kHz, EUT On Side
0.126	44.0	10.3	1.0	353.0	10.0	0.0	Par to GND	AV	-59.1	-4.8	25.6	-30.4	Tx 125 kHz, EUT Vert
0.125	63.2	10.3	1.0	350.0	10.0	0.0	Par to EUT	PK	-59.1	14.4	45.7	-31.3	Tx 125 kHz, EUT Vert
0.125	41.5	10.3	1.0	34.0	10.0	0.0	Perp to EUT	AV	-59.1	-7.3	25.7	-33.0	Tx 125 kHz, EUT Vert
0.125	56.6	10.3	1.0	281.0	10.0	0.0	Par to GND	PK	-59.1	7.8	45.7	-37.9	Tx 125 kHz, EUT Horz
0.124	55.9	10.3	1.0	291.0	10.0	0.0	Par to GND	PK	-59.1	7.1	45.8	-38.7	Tx 125 kHz, EUT On Side
0.126	52.6	10.3	1.0	353.0	10.0	0.0	Par to GND	PK	-59.1	3.8	45.6	-41.8	Tx 125 kHz, EUT Vert
0.120	51.3	10.3	1.0	34.0	10.0	0.0	Perp to EUT	PK	-59.1	2.5	46.0	-43.5	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, DUAL CH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna pins 05&06 & 03&04

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 7

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, DUAL CH

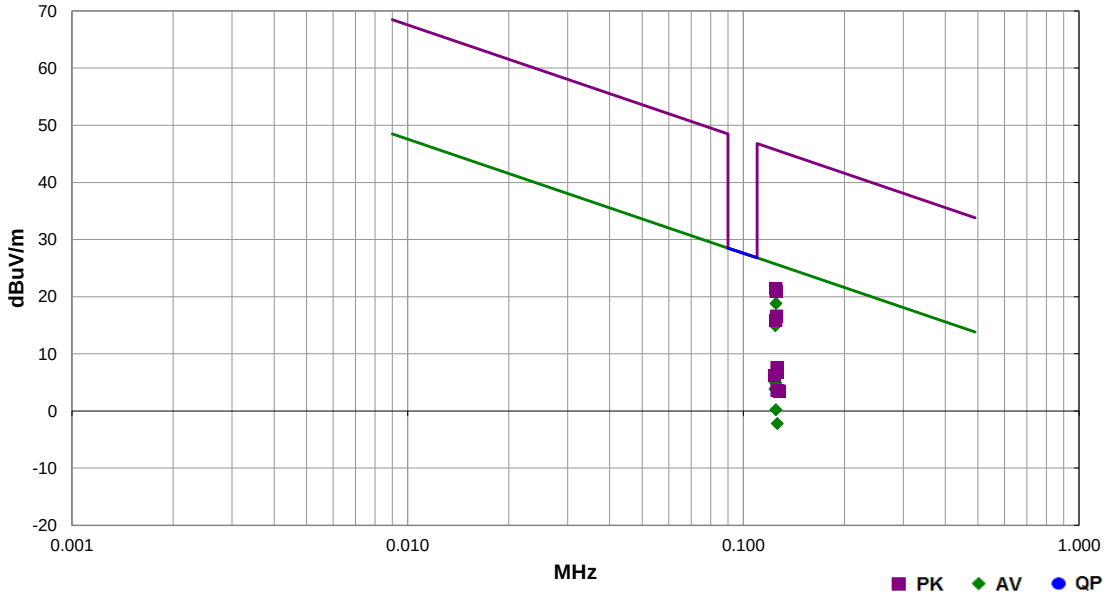
element

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-30		
Project:	None	**Temperature:**	18.9 °C		
Job Site:	OC08	**Humidity:**	54.5% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	7				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna pins 05&06 & 03&04				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	10	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	69.5	10.3	1.0	179.0	10.0	0.0	Perp to EUT	AV	-59.1	20.7	25.7	-5.0	Tx 125 kHz, EUT on Side
0.125	67.6	10.3	1.0	97.0	10.0	0.0	Perp to EUT	AV	-59.1	18.8	25.7	-6.9	Tx 125 kHz, EUT Horz
0.125	64.6	10.3	1.0	83.0	10.0	0.0	Par to EUT	AV	-59.1	15.8	25.7	-9.9	Tx 125 kHz, EUT on Side
0.125	63.7	10.3	1.0	1.0	10.0	0.0	Par to EUT	AV	-59.1	14.9	25.7	-10.8	Tx 125 kHz, EUT Horz
0.125	53.7	10.3	1.0	97.0	10.0	0.0	Par to GND	AV	-59.1	4.9	25.7	-20.8	Tx 125 kHz, EUT on Side
0.126	53.0	10.3	1.0	360.0	10.0	0.0	Par to EUT	AV	-59.1	4.2	25.6	-21.4	Tx 125 kHz, EUT Vert
0.124	52.6	10.3	1.0	359.0	10.0	0.0	Par to GND	AV	-59.1	3.8	25.7	-21.9	Tx 125 kHz, EUT Horz
0.125	70.2	10.3	1.0	97.0	10.0	0.0	Perp to EUT	PK	-59.1	21.4	45.7	-24.3	Tx 125 kHz, EUT Horz
0.125	69.7	10.3	1.0	12.0	10.0	0.0	Perp to EUT	PK	-59.1	20.9	45.7	-24.8	Tx 125 kHz, EUT on Side
0.125	49.0	10.3	1.0	170.0	10.0	0.0	Perp to EUT	AV	-59.1	0.2	25.7	-25.5	Tx 125 kHz, EUT Vert
0.126	46.6	10.3	1.0	78.0	10.0	0.0	Par to GND	AV	-59.1	-2.2	25.6	-27.8	Tx 125 kHz, EUT Vert
0.126	65.4	10.3	1.0	83.0	10.0	0.0	Par to EUT	PK	-59.1	16.6	45.6	-29.0	Tx 125 kHz, EUT on Side
0.125	64.7	10.3	1.0	1.0	10.0	0.0	Par to EUT	PK	-59.1	15.9	45.7	-29.8	Tx 125 kHz, EUT Horz
0.126	56.4	10.3	1.0	97.0	10.0	0.0	Par to GND	PK	-59.1	7.6	45.6	-38.0	Tx 125 kHz, EUT on Side
0.126	55.6	10.3	1.0	360.0	10.0	0.0	Par to EUT	PK	-59.1	6.8	45.6	-38.8	Tx 125 kHz, EUT Vert
0.124	55.0	10.3	1.0	359.0	10.0	0.0	Par to GND	PK	-59.1	6.2	45.8	-39.6	Tx 125 kHz, EUT Horz
0.128	52.3	10.3	1.0	170.0	10.0	0.0	Perp to EUT	PK	-59.1	3.5	45.5	-42.0	Tx 125 kHz, EUT Vert
0.126	52.4	10.3	1.0	78.0	10.0	0.0	Par to GND	PK	-59.1	3.6	45.6	-42.0	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, DUAL CH PEPS IMMO

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo, 03&04.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 8

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

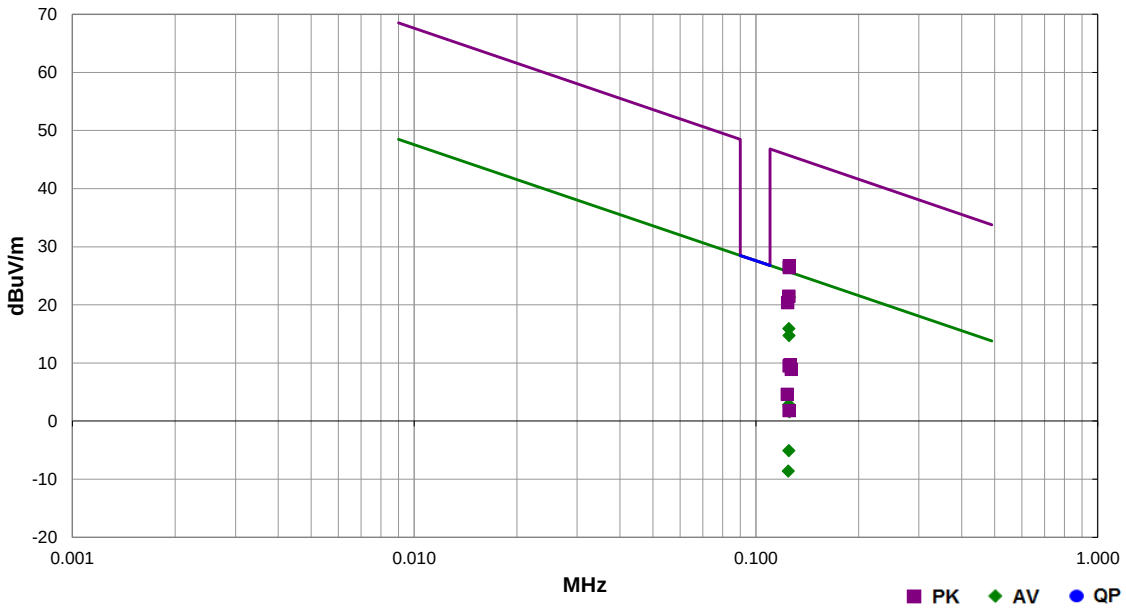
FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, DUAL CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-30		
Project:	None	**Temperature:**	19.2 °C		
Job Site:	OC08	**Humidity:**	56.6% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1013 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	8				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo, 03&04.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	13	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	70.1	10.3	1.0	107.0	10.0	0.0	Perp to EUT	AV	-59.1	21.3	25.7	-4.4	Tx 125 kHz, EUT Horz
0.125	70.0	10.3	1.0	355.0	10.0	0.0	Perp to EUT	AV	-59.1	21.2	25.7	-4.5	Tx 125 kHz, EUT on Side
0.125	64.7	10.3	1.0	24.0	10.0	0.0	Par to EUT	AV	-59.1	15.9	25.7	-9.8	Tx 125 kHz, EUT Horz
0.125	63.5	10.3	1.0	122.0	10.0	0.0	Par to EUT	AV	-59.1	14.7	25.7	-11.0	Tx 125 kHz, EUT on Side
0.125	75.5	10.3	1.0	107.0	10.0	0.0	Perp to EUT	PK	-59.1	26.7	45.7	-19.0	Tx 125 kHz, EUT Horz
0.125	75.2	10.3	1.0	355.0	10.0	0.0	Perp to EUT	PK	-59.1	26.4	45.7	-19.3	Tx 125 kHz, EUT on Side
0.125	51.6	10.3	1.0	13.0	10.0	0.0	Par to GND	AV	-59.1	2.8	25.7	-22.9	Tx 125 kHz, EUT Horz
0.125	51.3	10.3	1.0	308.0	10.0	0.0	Par to GND	AV	-59.1	2.5	25.7	-23.2	Tx 125 kHz, EUT on Side
0.125	50.4	10.3	1.0	248.0	10.0	0.0	Par to GND	AV	-59.1	1.6	25.7	-24.1	Tx 125 kHz, EUT Vert
0.125	70.3	10.3	1.0	24.0	10.0	0.0	Par to EUT	PK	-59.1	21.5	45.7	-24.2	Tx 125 kHz, EUT Horz
0.124	69.2	10.3	1.0	122.0	10.0	0.0	Par to EUT	PK	-59.1	20.4	45.8	-25.4	Tx 125 kHz, EUT on Side
0.125	43.7	10.3	1.0	352.0	10.0	0.0	Par to GND	AV	-59.1	-5.1	25.7	-30.8	Tx 125 kHz, EUT Vert
0.124	40.2	10.3	1.0	217.0	10.0	0.0	Perp to EUT	AV	-59.1	-8.6	25.7	-34.3	Tx 125 kHz, EUT Vert
0.126	58.5	10.3	1.0	13.0	10.0	0.0	Par to GND	PK	-59.1	9.7	45.6	-35.9	Tx 125 kHz, EUT Horz
0.125	58.3	10.3	1.0	248.0	10.0	0.0	Par to GND	PK	-59.1	9.5	45.7	-36.2	Tx 125 kHz, EUT Vert
0.127	57.7	10.3	1.0	308.0	10.0	0.0	Par to GND	PK	-59.1	8.9	45.6	-36.7	Tx 125 kHz, EUT on Side
0.124	53.4	10.3	1.0	352.0	10.0	0.0	Par to GND	PK	-59.1	4.6	45.8	-41.2	Tx 125 kHz, EUT Vert
0.125	50.6	10.3	1.0	217.0	10.0	0.0	Perp to EUT	PK	-59.1	1.8	45.7	-43.9	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, APPROACH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, 05&06.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

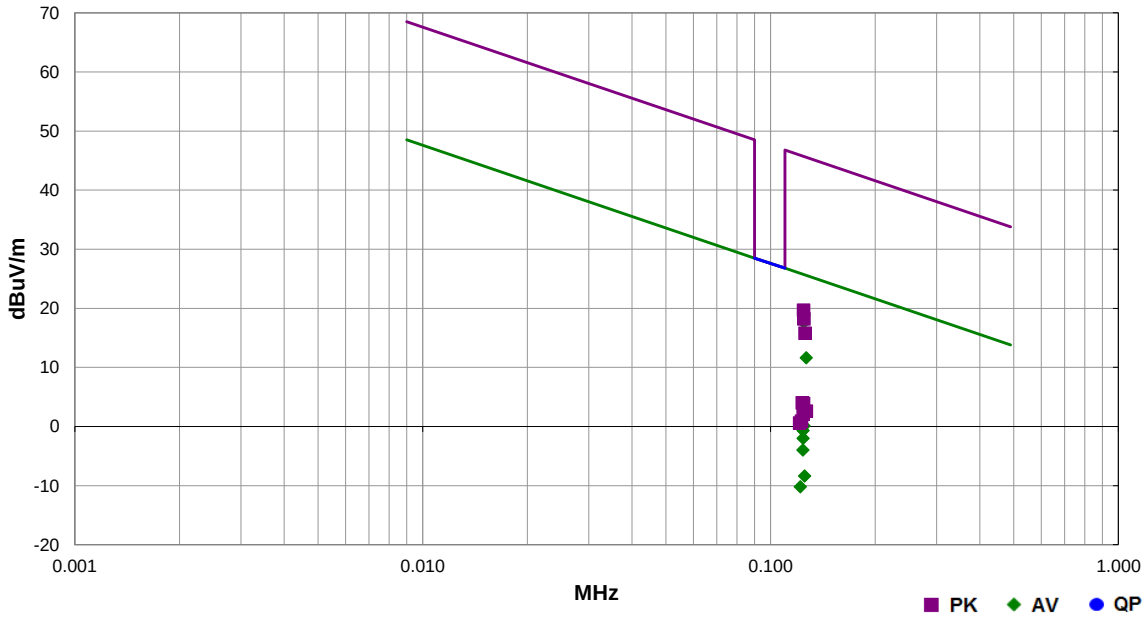
FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, APPROACH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-30		
Project:	None	**Temperature:**	18.9 °C		
Job Site:	OC08	**Humidity:**	54.5% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1014 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	5				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, 05&06.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	8	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.125	66.4	10.3	1.0	15.0	10.0	0.0	Perp to EUT	AV	-59.1	17.6	25.7	-8.1	Tx 125 kHz, EUT on Side
0.127	60.4	10.3	1.0	24.0	10.0	0.0	Par to EUT	AV	-59.1	11.6	25.6	-14.0	Tx 125 kHz, EUT Horz
0.124	48.9	10.3	1.0	356.0	10.0	0.0	Par to EUT	AV	-59.1	0.1	25.7	-25.6	Tx 125 kHz, EUT on Side
0.125	48.9	10.3	1.0	76.0	10.0	0.0	Par to EUT	AV	-59.1	0.1	25.7	-25.6	Tx 125 kHz, EUT Vert
0.124	68.5	10.3	1.0	-1.0	10.0	0.0	Perp to EUT	PK	-59.1	19.7	45.7	-26.0	Tx 125 kHz, EUT on Side
0.124	48.1	10.3	1.0	180.0	10.0	0.0	Par to GND	AV	-59.1	-0.7	25.7	-26.4	Tx 125 kHz, EUT Horz
0.125	67.0	10.3	1.0	303.0	10.0	0.0	Perp to EUT	PK	-59.1	18.2	45.7	-27.5	Tx 125 kHz, EUT Horz
0.124	46.8	10.3	1.0	70.0	10.0	0.0	Par to GND	AV	-59.1	-2.0	25.7	-27.7	Tx 125 kHz, EUT on Side
0.126	64.6	10.3	1.0	24.0	10.0	0.0	Par to EUT	PK	-59.1	15.8	45.6	-29.8	Tx 125 kHz, EUT Horz
0.124	44.8	10.3	1.0	130.0	10.0	0.0	Par to GND	AV	-59.1	-4.0	25.8	-29.8	Tx 125 kHz, EUT Vert
0.125	40.4	10.3	1.0	61.0	10.0	0.0	Perp to EUT	AV	-59.1	-8.4	25.7	-34.1	Tx 125 kHz, EUT Vert
0.122	38.6	10.3	1.0	275.0	10.0	0.0	Perp to EUT	AV	-59.1	-10.2	25.9	-36.1	Tx 125 kHz, EUT Horz
0.123	52.8	10.3	1.0	180.0	10.0	0.0	Par to GND	PK	-59.1	4.0	45.8	-41.8	Tx 125 kHz, EUT Horz
0.124	52.7	10.3	1.0	356.0	10.0	0.0	Par to EUT	PK	-59.1	3.9	45.7	-41.8	Tx 125 kHz, EUT on Side
0.127	51.4	10.3	1.0	76.0	10.0	0.0	Par to EUT	PK	-59.1	2.6	45.6	-43.0	Tx 125 kHz, EUT Vert
0.124	50.9	10.3	1.0	70.0	10.0	0.0	Par to GND	PK	-59.1	2.1	45.7	-43.6	Tx 125 kHz, EUT on Side
0.123	49.7	10.3	1.0	293.0	10.0	0.0	Perp to EUT	PK	-59.1	0.9	45.8	-44.9	Tx 125 kHz, EUT Vert
0.121	49.4	10.3	1.0	130.0	10.0	0.0	Par to GND	PK	-59.1	0.6	46.0	-45.4	Tx 125 kHz, EUT Vert

FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, IMMOBILIZER

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 9

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	490 kHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

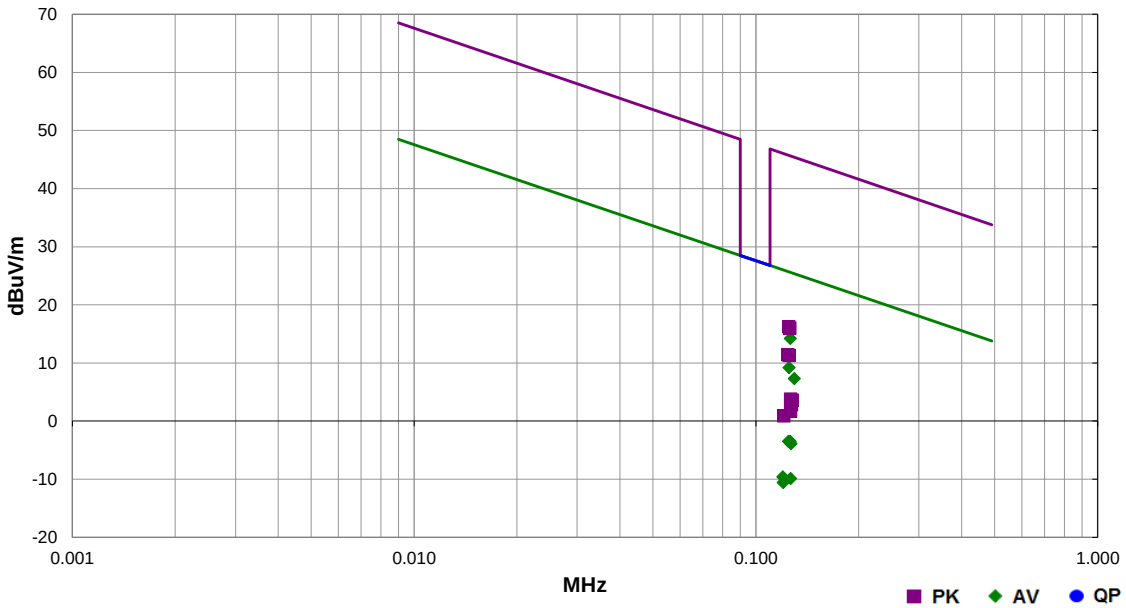
FIELD STRENGTH OF FUNDAMENTAL - FULL BRIDGE, IMMOBILIZER

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2021-12-30		
Project:	None	**Temperature:**	19.2 °C		
Job Site:	OC08	**Humidity:**	56.6% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1013 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	9				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing				

Test Specifications	**Test Method**
FCC 15.209:2021	ANSI C63.10:2013

Run #	14	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.126	63.0	10.3	1.0	8.0	10.0	0.0	Perp to EUT	AV	-59.1	14.2	25.6	-11.4	Tx 125 kHz, EUT on Side
0.125	58.0	10.3	1.0	83.0	10.0	0.0	Par to EUT	AV	-59.1	9.2	25.7	-16.5	Tx 125 kHz, EUT on Side
0.130	56.1	10.3	1.0	82.0	10.0	0.0	Perp to EUT	AV	-59.1	7.3	25.4	-18.1	Tx 125 kHz, EUT Horz
0.126	45.3	10.3	1.0	16.0	10.0	0.0	Par to GND	AV	-59.1	-3.5	25.6	-29.1	Tx 125 kHz, EUT Horz
0.125	45.3	10.3	1.0	197.0	10.0	0.0	Par to EUT	AV	-59.1	-3.5	25.7	-29.2	Tx 125 kHz, EUT Vert
0.127	44.9	10.3	1.0	104.0	10.0	0.0	Par to GND	AV	-59.1	-3.9	25.6	-29.5	Tx 125 kHz, EUT on Side
0.125	65.0	10.3	1.0	82.0	10.0	0.0	Perp to EUT	PK	-59.1	16.2	45.7	-29.5	Tx 125 kHz, EUT Horz
0.126	64.8	10.3	1.0	8.0	10.0	0.0	Perp to EUT	PK	-59.1	16.0	45.6	-29.6	Tx 125 kHz, EUT on Side
0.124	60.2	10.3	1.0	22.0	10.0	0.0	Par to EUT	PK	-59.1	11.4	45.8	-34.4	Tx 125 kHz, EUT Horz
0.125	60.1	10.3	1.0	83.0	10.0	0.0	Par to EUT	PK	-59.1	11.3	45.7	-34.4	Tx 125 kHz, EUT on Side
0.126	38.9	10.3	1.0	314.0	10.0	0.0	Par to GND	AV	-59.1	-9.9	25.6	-35.5	Tx 125 kHz, EUT Vert
0.120	39.2	10.3	1.0	22.0	10.0	0.0	Par to EUT	AV	-59.1	-9.6	26.0	-35.6	Tx 125 kHz, EUT Horz
0.120	38.2	10.3	1.0	350.0	10.0	0.0	Perp to EUT	AV	-59.1	-10.6	26.0	-36.6	Tx 125 kHz, EUT Vert
0.126	52.6	10.3	1.0	197.0	10.0	0.0	Par to EUT	PK	-59.1	3.8	45.6	-41.8	Tx 125 kHz, EUT Vert
0.128	52.4	10.3	1.0	104.0	10.0	0.0	Par to GND	PK	-59.1	3.6	45.5	-41.9	Tx 125 kHz, EUT on Side
0.127	51.6	10.3	1.0	16.0	10.0	0.0	Par to GND	PK	-59.1	2.8	45.5	-42.7	Tx 125 kHz, EUT Horz
0.126	50.5	10.3	1.0	350.0	10.0	0.0	Perp to EUT	PK	-59.1	1.7	45.6	-43.9	Tx 125 kHz, EUT Vert
0.121	49.7	10.3	1.0	314.0	10.0	0.0	Par to GND	PK	-59.1	0.9	46.0	-45.1	Tx 125 kHz, EUT Vert

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - HALF BRIDGE, SINGLE CH

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half Bridge. Test Mode: Single Ch PEPS on BCM Antenna Pins 01&01R.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

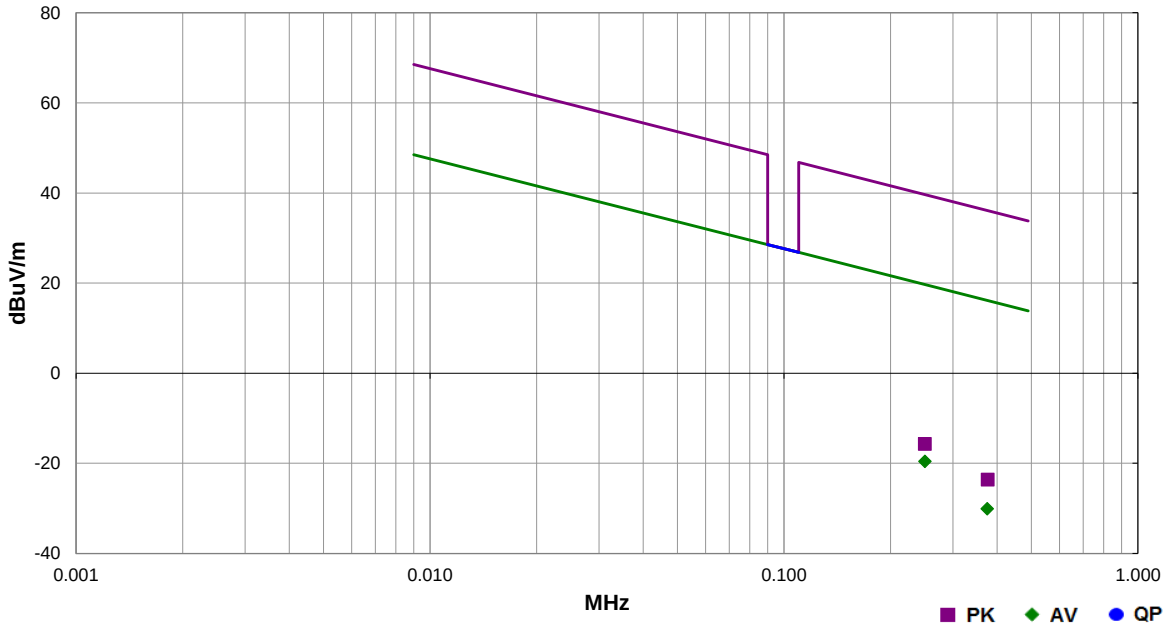
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - HALF BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	2				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Single Ch PEPS on BCM Antenna Pins 01&01R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	4	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.250	50.2	10.2	1.0	206.0	3.0	0.0	Perp to EUT	AV	-80.0	-19.6	19.6	-39.2	Tx, 125 kHz, EUT On Side
0.375	39.4	10.5	1.0	184.0	3.0	0.0	Perp to EUT	AV	-80.0	-30.1	16.1	-46.2	Tx, 125 kHz, EUT On Side
0.250	54.1	10.2	1.0	206.0	3.0	0.0	Perp to EUT	PK	-80.0	-15.7	39.7	-55.4	Tx, 125 kHz, EUT On Side
0.377	45.9	10.5	1.0	184.0	3.0	0.0	Perp to EUT	PK	-80.0	-23.6	36.1	-59.7	Tx, 125 kHz, EUT On Side

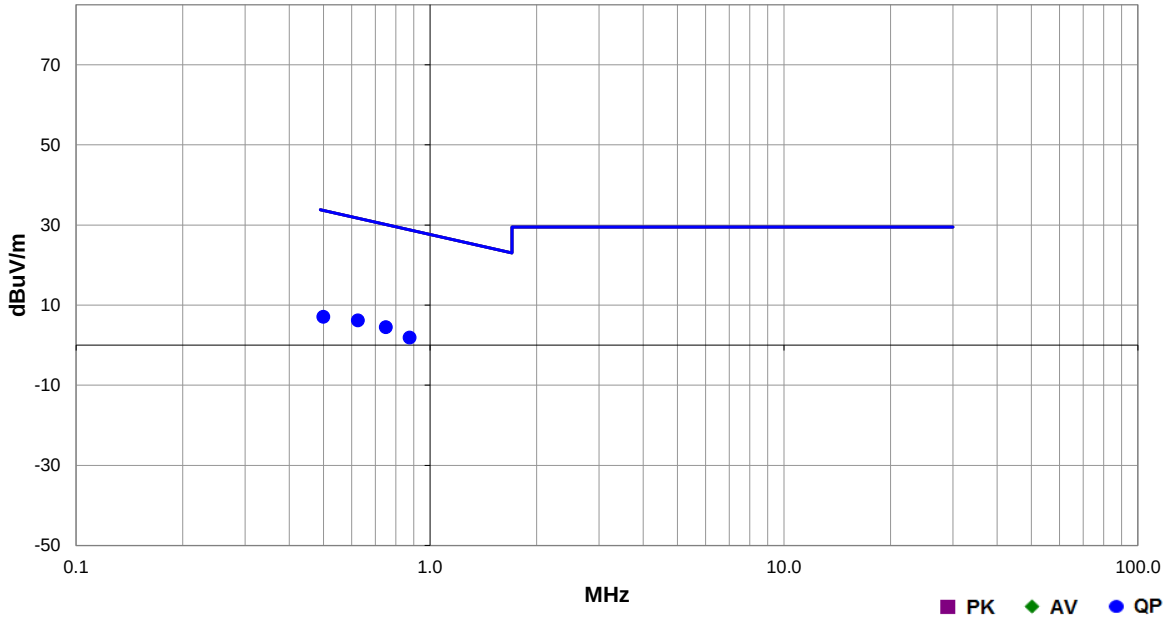
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - HALF BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	2				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Single Ch PEPS on BCM Antenna Pins 01&01R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	5	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	35.6	10.6	1.0	209.0	3.0	0.0	Perp to EUT	QP	-40.0	6.2	31.7	-25.5	Tx, 125 kHz, EUT On Side
0.750	33.9	10.6	1.0	219.0	3.0	0.0	Perp to EUT	QP	-40.0	4.5	30.1	-25.6	Tx, 125 kHz, EUT On Side
0.499	36.4	10.7	1.0	167.0	3.0	0.0	Perp to EUT	QP	-40.0	7.1	33.6	-26.5	Tx, 125 kHz, EUT On Side
0.875	31.2	10.7	1.0	170.0	3.0	0.0	Perp to EUT	QP	-40.0	1.9	28.8	-26.9	Tx, 125 kHz, EUT On Side

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ - HALF BRIDGE, DUAL CH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

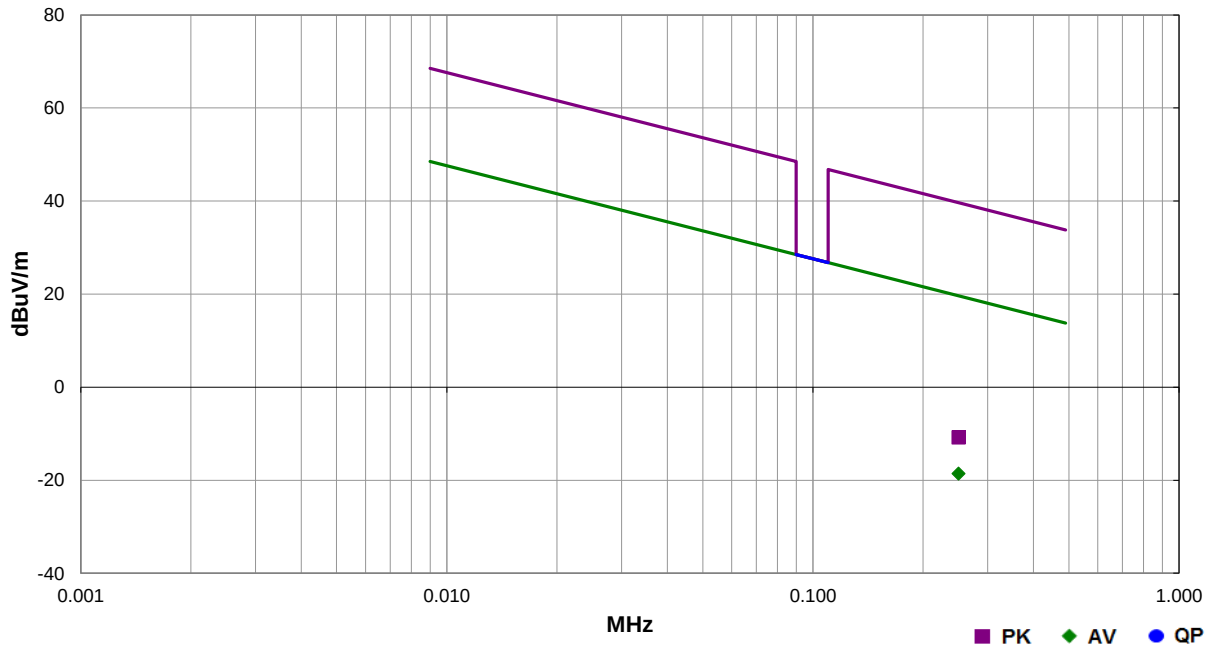
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ - HALF BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	3				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	6	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.250	51.1	10.3	1.0	113.0	3.0	0.0	Perp to EUT	AV	-80.0	-18.6	19.7	-38.3	Tx, 125 kHz, EUT Horz
0.250	59.0	10.2	1.0	113.0	3.0	0.0	Perp to EUT	PK	-80.0	-10.8	39.7	-50.5	Tx, 125 kHz, EUT Horz

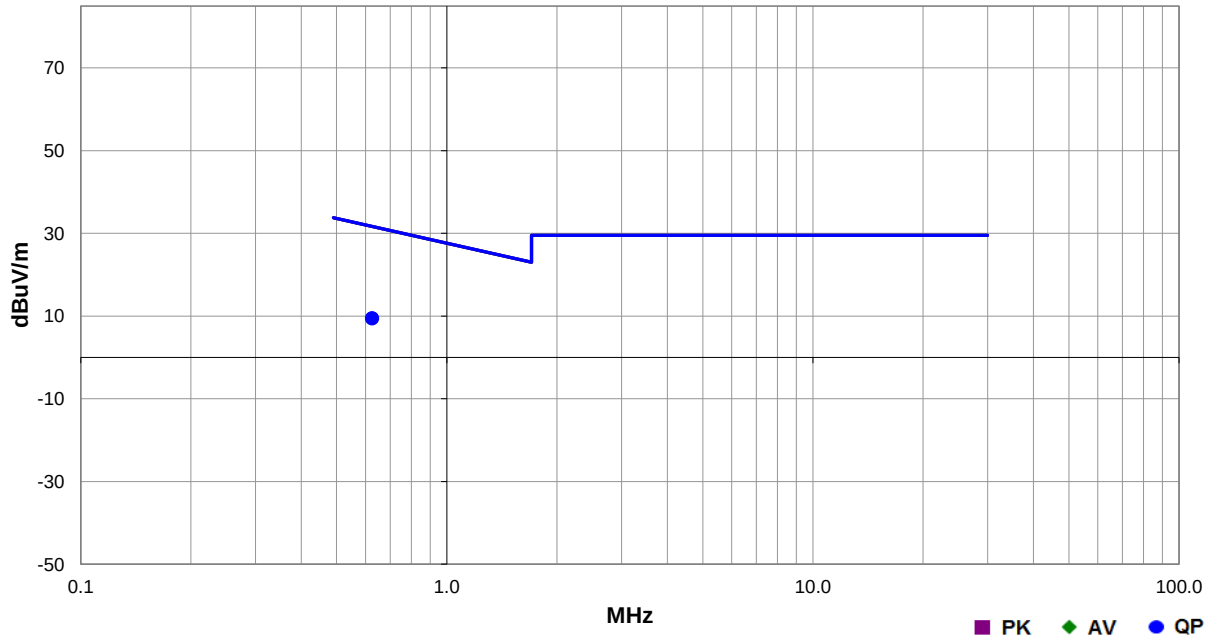
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ - HALF BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	3				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	7	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	38.9	10.6	1.0	111.0	3.0	0.0	Perp to EUT	QP	-40.0	9.5	31.7	-22.2	Tx, 125 kHz, EUT Horz

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - ROUND ROBIN

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Half-Bridge. Test Mode: Round Robin

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 10

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

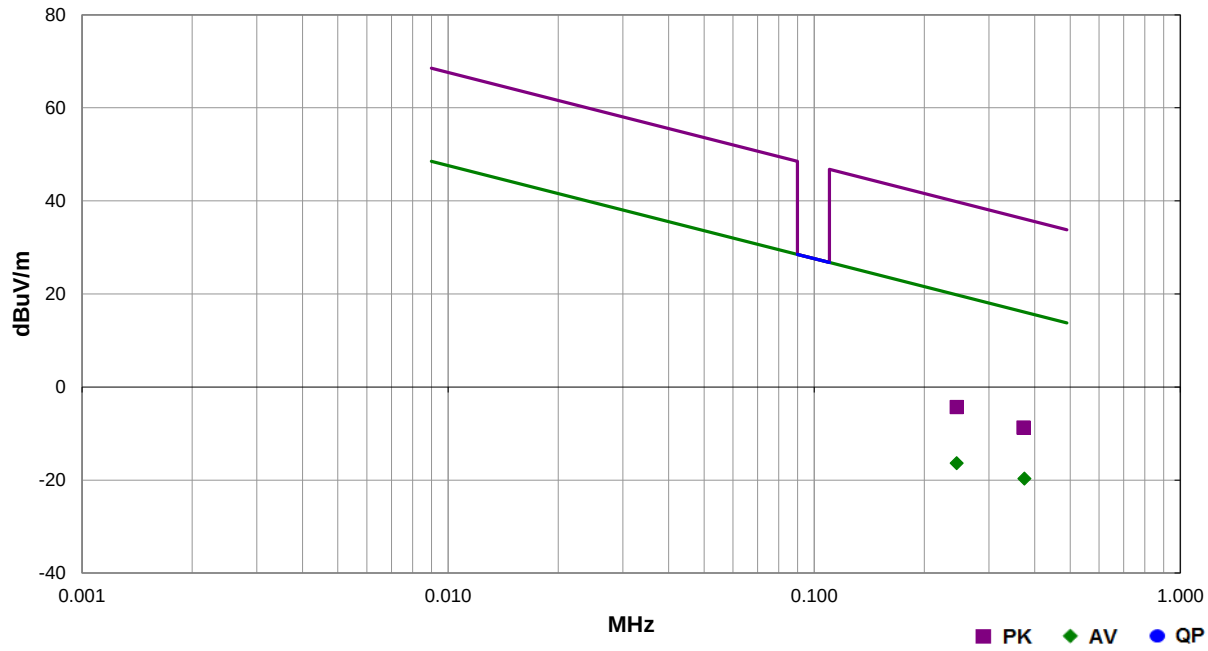
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - ROUND ROBIN

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-07		
Project:	None	**Temperature:**	18.7 °C		
Job Site:	OC08	**Humidity:**	52.3% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1016 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	10				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half-Bridge. Test Mode: Round Robin				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz). During Round Robin mode, each antenna pin will transmit if an antenna is connected. Hence only 1 antenna was terminated during field strength testing in order to determine worst case pin.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	16	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.375	29.2	10.2	1.0	158.0	10.0	0.0	Perp to EUT	AV	-59.1	-19.7	16.1	-35.8	Tx 125 kHz, EUT Horz
0.245	32.4	10.3	1.0	97.0	10.0	0.0	Perp to EUT	AV	-59.1	-16.4	19.8	-36.2	Tx 125 kHz, EUT Horz
0.245	44.5	10.3	1.0	97.0	10.0	0.0	Perp to EUT	PK	-59.1	-4.3	39.8	-44.1	Tx 125 kHz, EUT Horz
0.373	40.2	10.2	1.0	158.0	10.0	0.0	Perp to EUT	PK	-59.1	-8.7	36.2	-44.9	Tx 125 kHz, EUT Horz

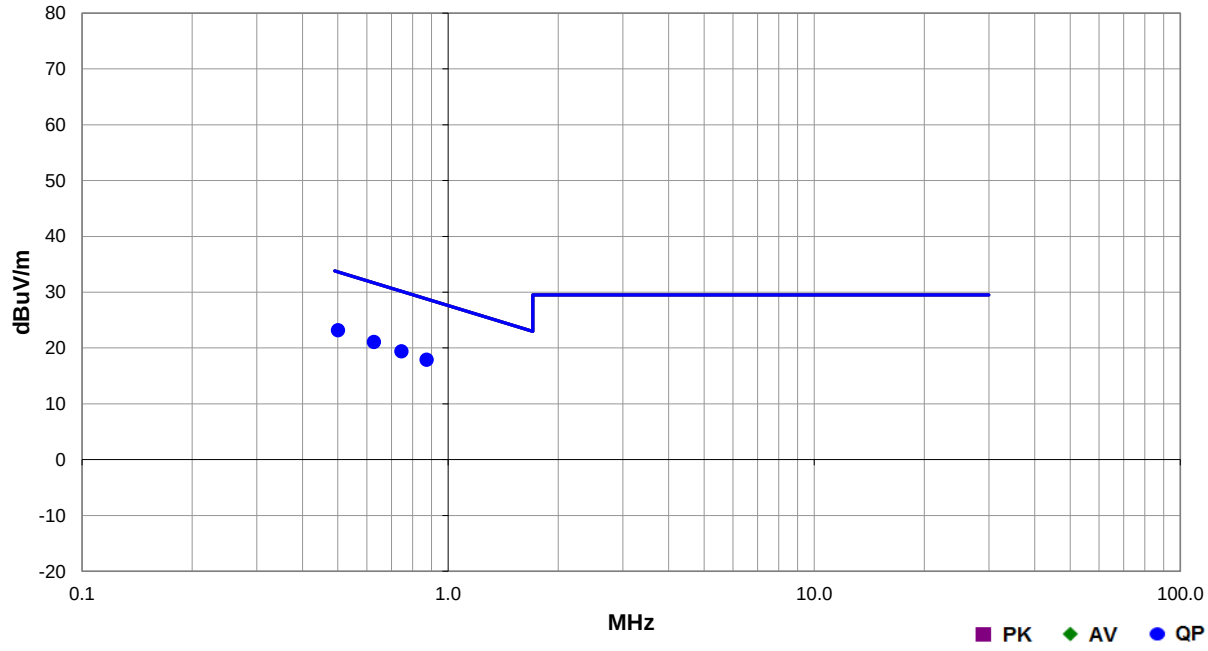
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - ROUND ROBIN

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-07		
Project:	None	**Temperature:**	18.7 °C		
Job Site:	OC08	**Humidity:**	52.3% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1016 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	10				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Half-Bridge. Test Mode: Round Robin				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz). During Round Robin mode, each antenna pin will transmit if an antenna is connected. Hence only 1 antenna was terminated during field strength testing in order to determine worst case pin.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	17	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.500	31.9	10.4	1.0	262.0	10.0	0.0	Perp to EUT	QP	-19.1	23.2	33.6	-10.4	Tx 125 kHz, EUT Horz
0.627	29.9	10.3	1.0	293.0	10.0	0.0	Perp to EUT	QP	-19.1	21.1	31.7	-10.6	Tx 125 kHz, EUT Horz
0.745	28.2	10.3	1.0	5.0	10.0	0.0	Perp to EUT	QP	-19.1	19.4	30.2	-10.8	Tx 125 kHz, EUT Horz
0.874	26.6	10.4	1.0	69.0	10.0	0.0	Perp to EUT	QP	-19.1	17.9	28.8	-10.9	Tx 125 kHz, EUT Horz

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins 05&06.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 6

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

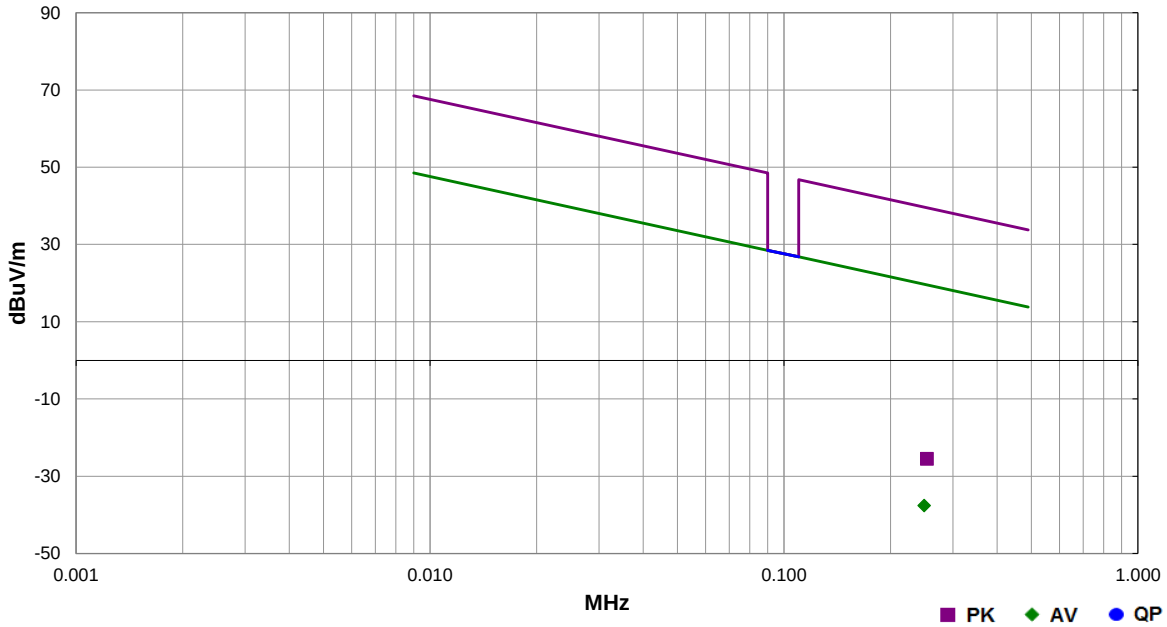
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	6				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins 05&06.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.249	32.1	10.3	1.0	264.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.6	19.7	-57.3	Tx, 125 kHz, EUT On Side
0.253	44.3	10.2	1.0	264.0	3.0	0.0	Perp to EUT	PK	-80.0	-25.5	39.5	-65.0	Tx, 125 kHz, EUT On Side

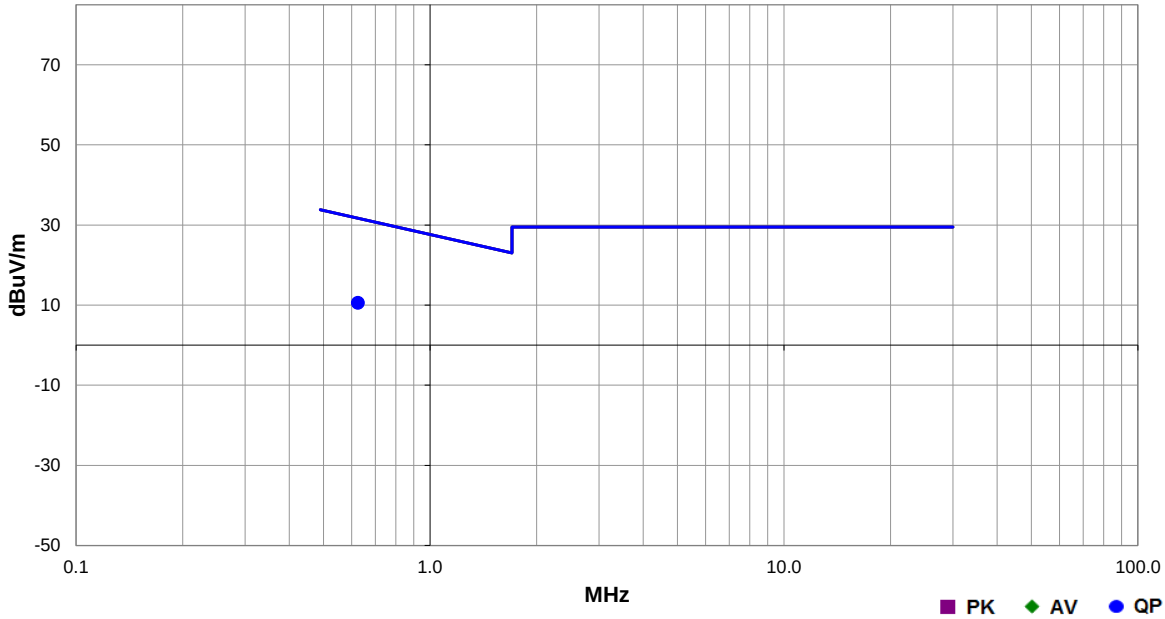
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	6				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins 05&06.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	18	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	40.0	10.6	1.0	19.0	3.0	0.0	Perp to EUT	QP	-40.0	10.6	31.7	-21.1	Tx, 125 kHz, EUT On Side

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH PEPS IMMO

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins IMMO Hi/Lo.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

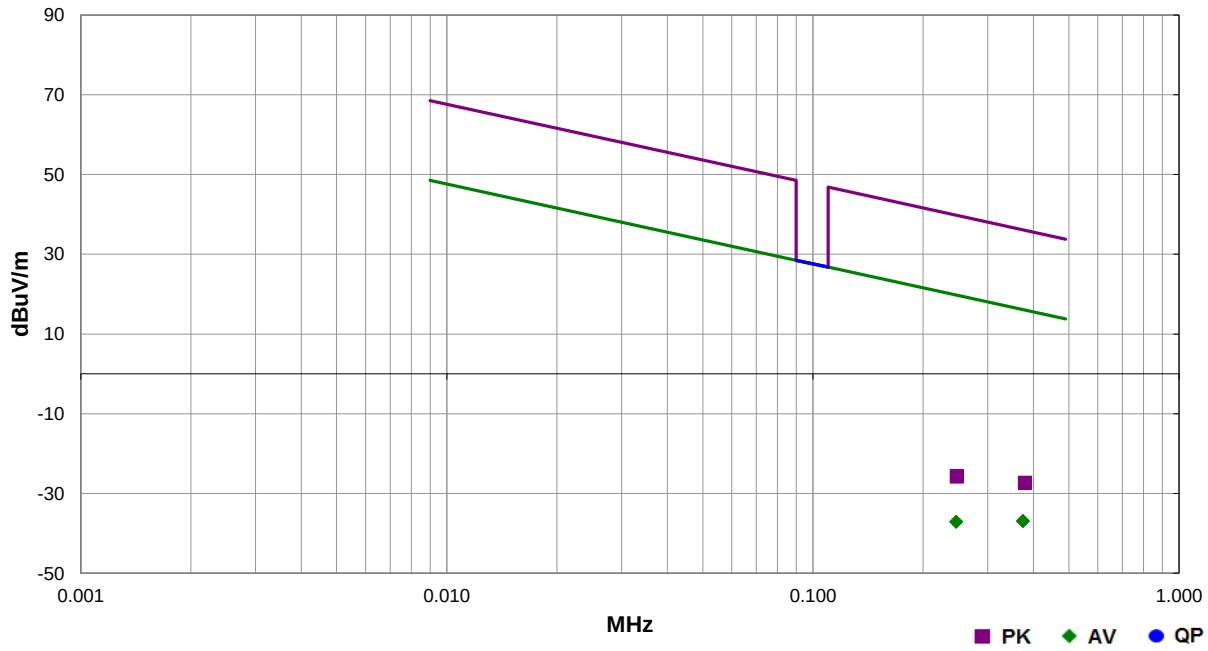
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	4				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.375	32.6	10.5	1.0	166.0	3.0	0.0	Perp to EUT	AV	-80.0	-36.9	16.1	-53.0	Tx, 125 kHz, EUT Horz
0.246	32.6	10.3	1.0	205.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.1	19.8	-56.9	Tx, 125 kHz, EUT Horz
0.379	42.2	10.5	1.0	166.0	3.0	0.0	Perp to EUT	PK	-80.0	-27.3	36.0	-63.3	Tx, 125 kHz, EUT Horz
0.247	44.0	10.3	1.0	205.0	3.0	0.0	Perp to EUT	PK	-80.0	-25.7	39.8	-65.5	Tx, 125 kHz, EUT Horz

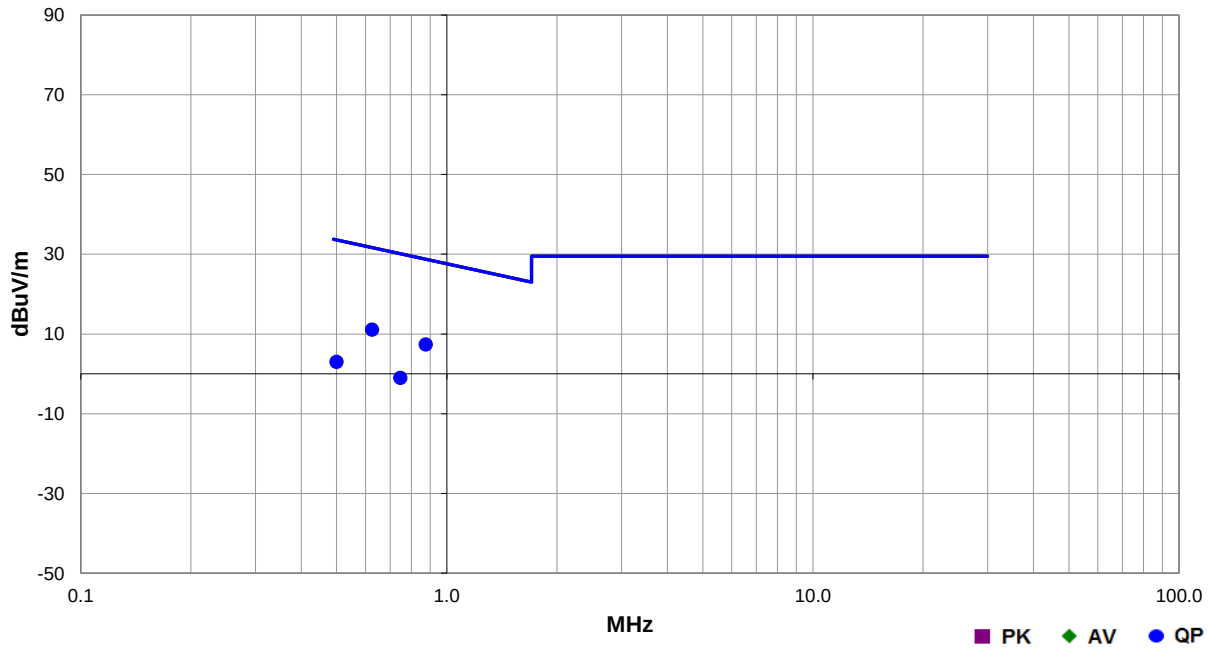
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, SINGLE CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	4				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	9	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	40.5	10.6	1.0	177.0	3.0	0.0	Perp to EUT	QP	-40.0	11.1	31.7	-20.6	Tx, 125 kHz, EUT Horz
0.875	36.7	10.7	1.0	29.0	3.0	0.0	Perp to EUT	QP	-40.0	7.4	28.8	-21.4	Tx, 125 kHz, EUT Horz
0.500	32.3	10.7	1.0	350.0	3.0	0.0	Perp to EUT	QP	-40.0	3.0	33.6	-30.6	Tx, 125 kHz, EUT Horz
0.747	28.4	10.6	1.0	222.0	3.0	0.0	Perp to EUT	QP	-40.0	-1.0	30.2	-31.2	Tx, 125 kHz, EUT Horz

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 05&06 and 03&04.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 7

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

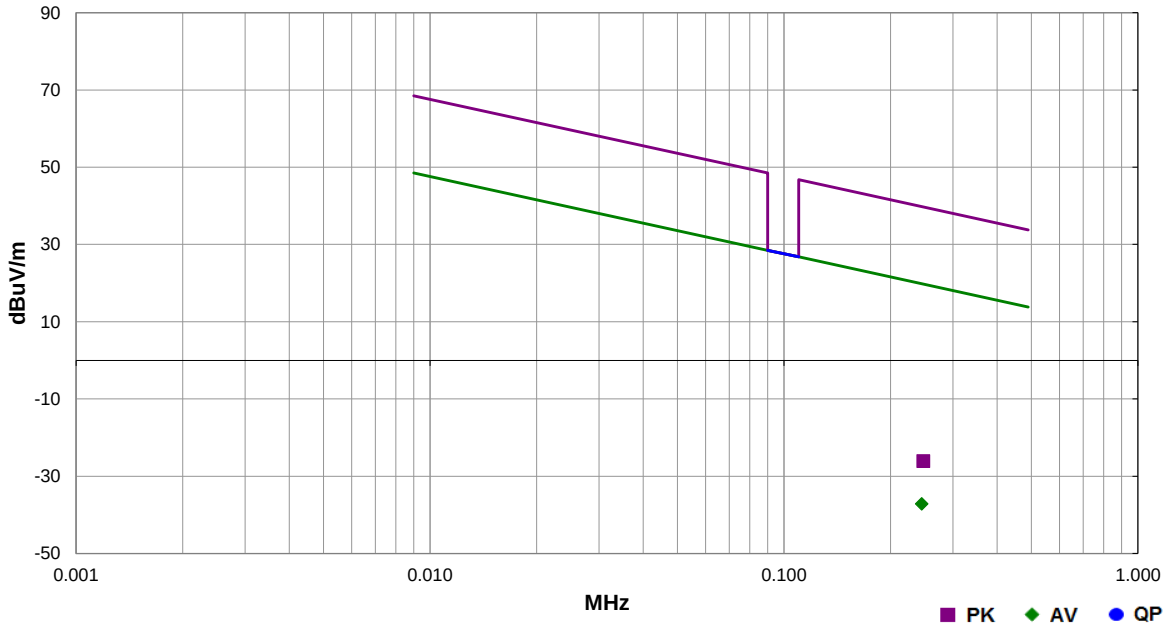
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	7				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 05&06 and 03&04.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	20	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.245	32.5	10.3	1.0	77.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.2	19.8	-57.0	Tx, 125 kHz, EUT On Side
0.248	43.6	10.3	1.0	77.0	3.0	0.0	Perp to EUT	PK	-80.0	-26.1	39.7	-65.8	Tx, 125 kHz, EUT On Side

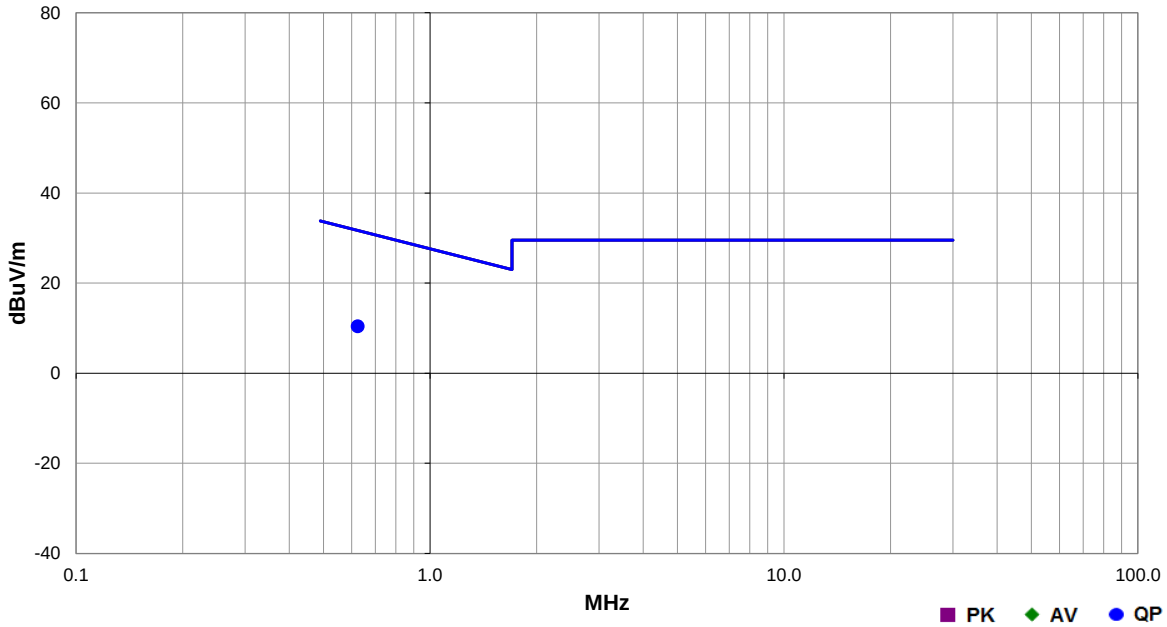
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	7				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 05&06 and 03&04.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	21	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	39.8	10.6	1.0	4.0	3.0	0.0	Perp to EUT	QP	-40.0	10.4	31.7	-21.3	Tx, 125 kHz, EUT On Side

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH PEPS IMMO

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo and 03&04.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 8

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

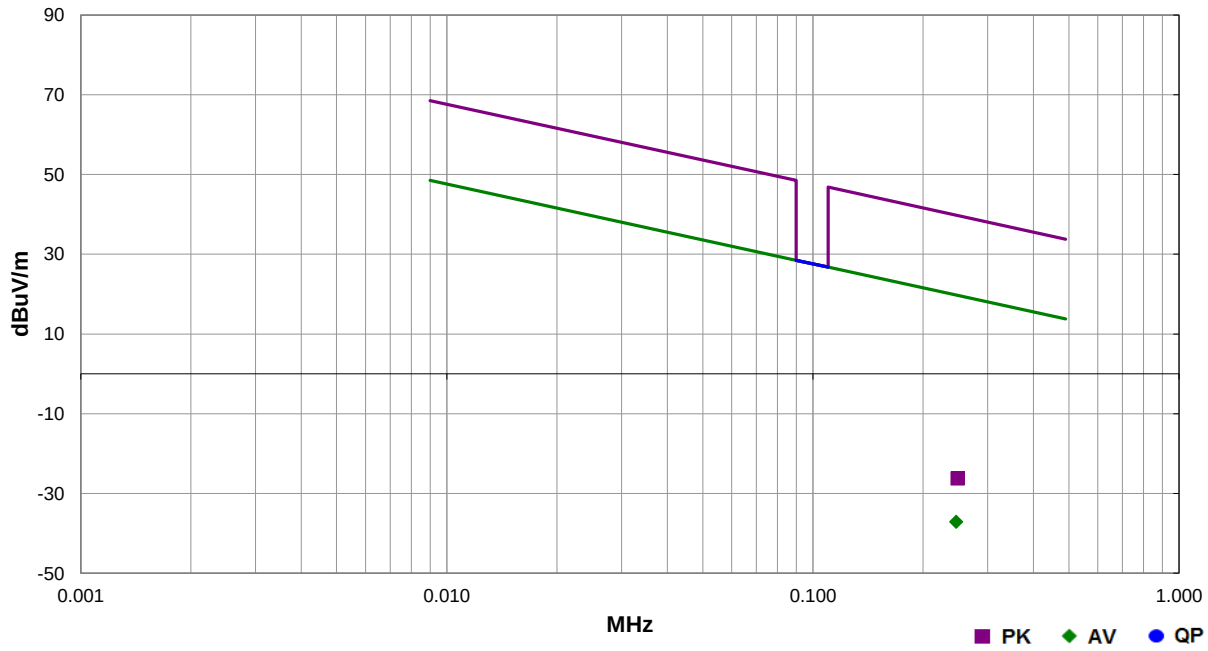
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	8				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo and 03&04.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	22	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.246	32.6	10.3	1.0	86.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.1	19.8	-56.9	Tx, 125 kHz, EUT Horz
0.248	43.5	10.3	1.0	86.0	3.0	0.0	Perp to EUT	PK	-80.0	-26.2	39.7	-65.9	Tx, 125 kHz, EUT Horz

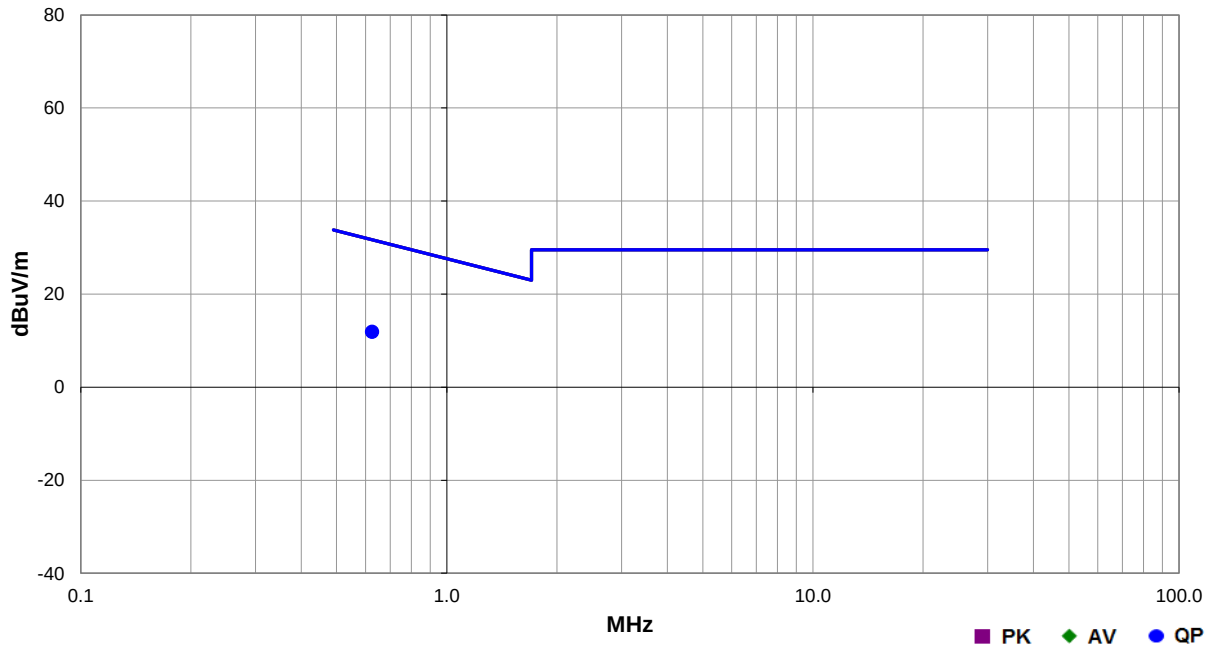
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, DUAL CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	8				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo and 03&04.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT Horz).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	23	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	41.3	10.6	1.0	145.0	3.0	0.0	Perp to EUT	QP	-40.0	11.9	31.7	-19.8	Tx, 125 kHz, EUT Horz

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, APPROACH

element

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, and 05&06.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

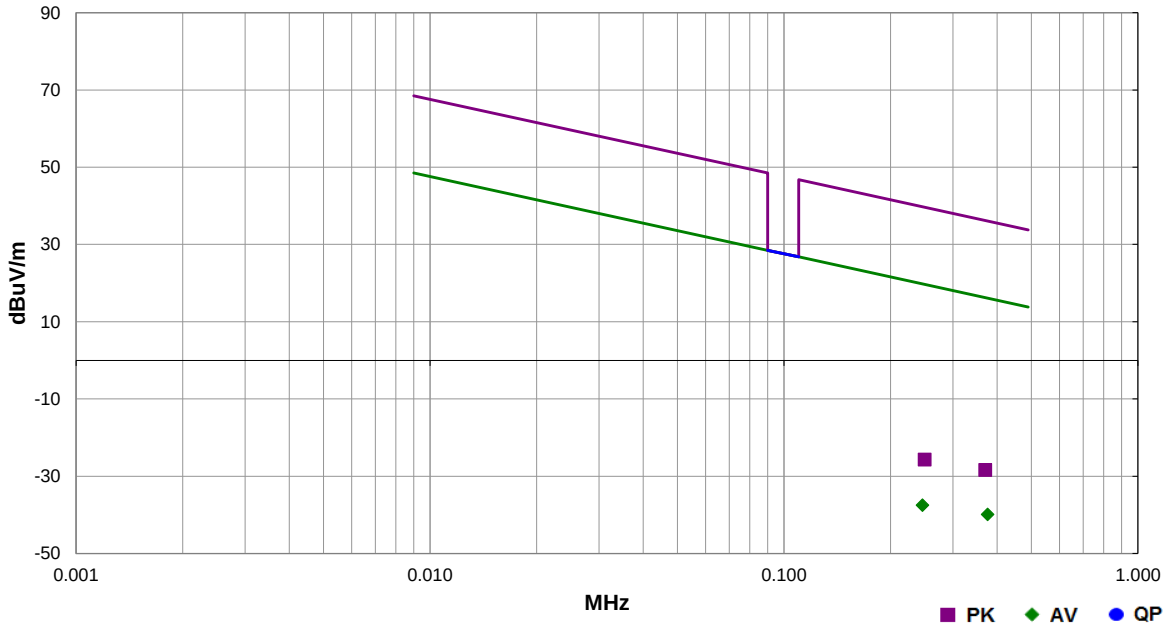
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, APPROACH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	5				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, and 05&06.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	10	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.376	29.6	10.5	1.0	220.0	3.0	0.0	Perp to EUT	AV	-80.0	-39.9	16.1	-56.0	Tx, 125 kHz, EUT On Side
0.246	32.2	10.3	1.0	34.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.5	19.8	-57.3	Tx, 125 kHz, EUT On Side
0.371	41.1	10.5	1.0	220.0	3.0	0.0	Perp to EUT	PK	-80.0	-28.4	36.2	-64.6	Tx, 125 kHz, EUT On Side
0.250	44.0	10.3	1.0	34.0	3.0	0.0	Perp to EUT	PK	-80.0	-25.7	39.7	-65.4	Tx, 125 kHz, EUT On Side

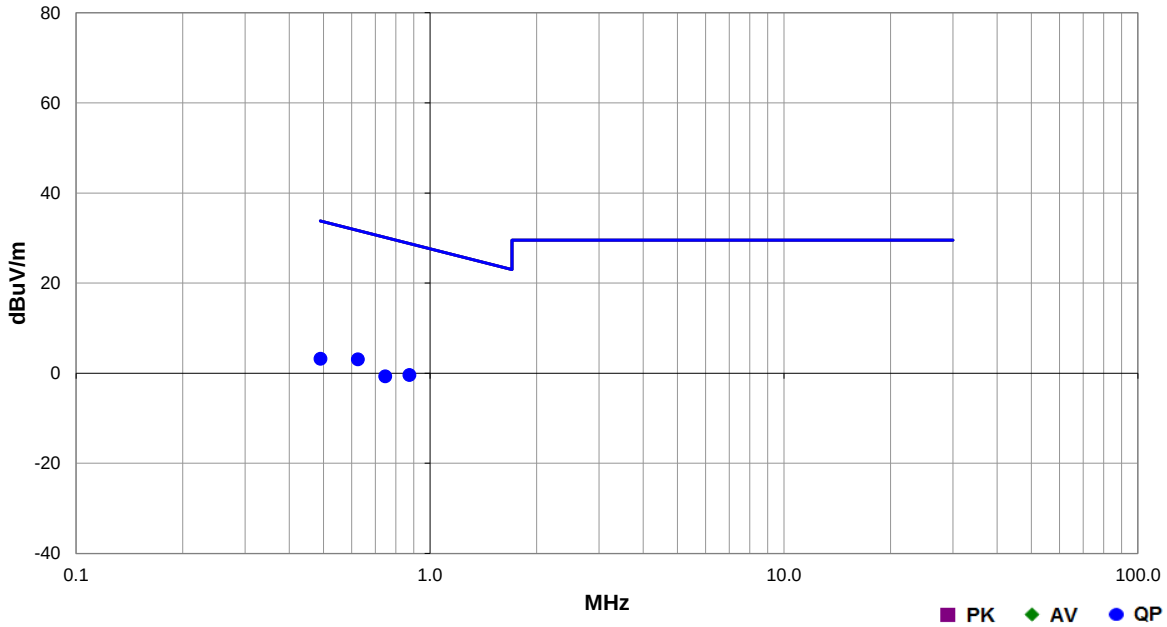
SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, APPROACH

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	5				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, and 05&06.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	11	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.625	32.5	10.6	1.0	177.0	3.0	0.0	Perp to EUT	QP	-40.0	3.1	31.7	-28.6	Tx, 125 kHz, EUT On Side
0.874	28.9	10.7	1.0	22.0	3.0	0.0	Perp to EUT	QP	-40.0	-0.4	28.8	-29.2	Tx, 125 kHz, EUT On Side
0.490	32.5	10.7	1.0	270.0	3.0	0.0	Perp to EUT	QP	-40.0	3.2	33.8	-30.6	Tx, 125 kHz, EUT On Side
0.747	28.7	10.6	1.0	353.0	3.0	0.0	Perp to EUT	QP	-40.0	-0.7	30.2	-30.9	Tx, 125 kHz, EUT On Side

SPURIOUS RADIATED EMISSIONS (LESS THAN 30 MHZ) - FULL BRIDGE, IMMOBILIZER

PSA-ESCI 2021.12.10.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz. Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo.

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 9

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	Northwest EMC	3kHz - 1GHz RE Cables	OCB	2021-06-25	2022-06-25
Antenna - Loop	EMCO	6502	AZB	2021-09-03	2023-09-03
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	2021-08-26	2022-08-26

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height (where applicable) and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = CISPR Average Detector

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

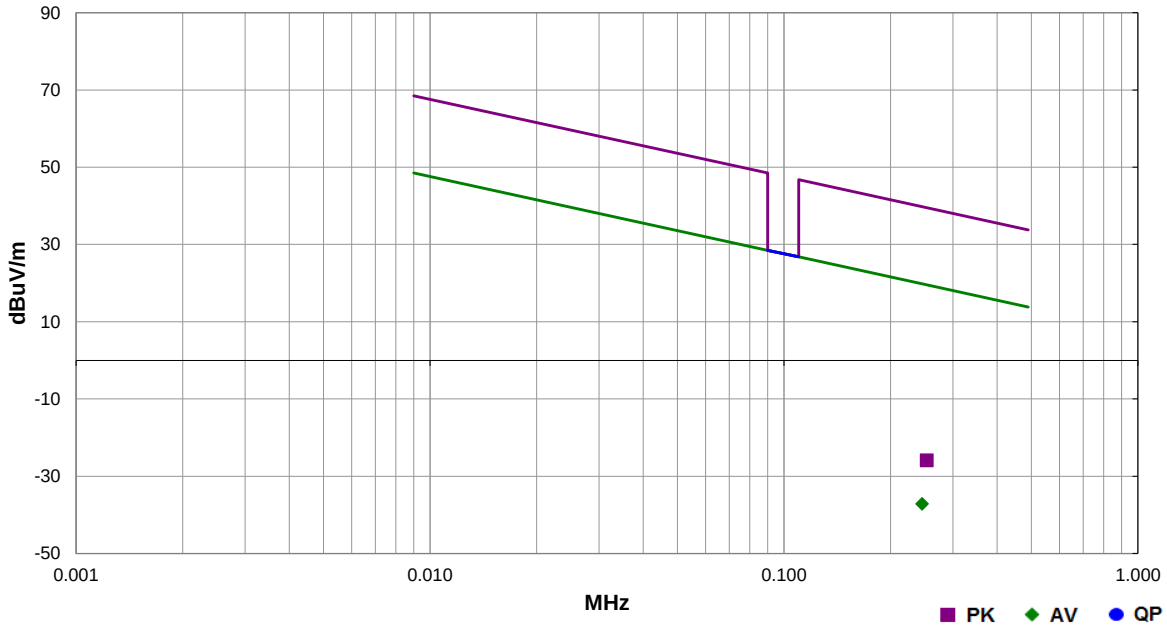
SPURIOUS RADIATED EMISSIONS
(LESS THAN 30 MHZ) - FULL BRIDGE, IMMOBILIZER

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	9				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	24	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.246	32.5	10.3	1.0	150.0	3.0	0.0	Perp to EUT	AV	-80.0	-37.2	19.8	-57.0	Tx, 125 kHz, EUT On Side
0.253	43.9	10.2	1.0	150.0	3.0	0.0	Perp to EUT	PK	-80.0	-25.9	39.6	-65.5	Tx, 125 kHz, EUT On Side

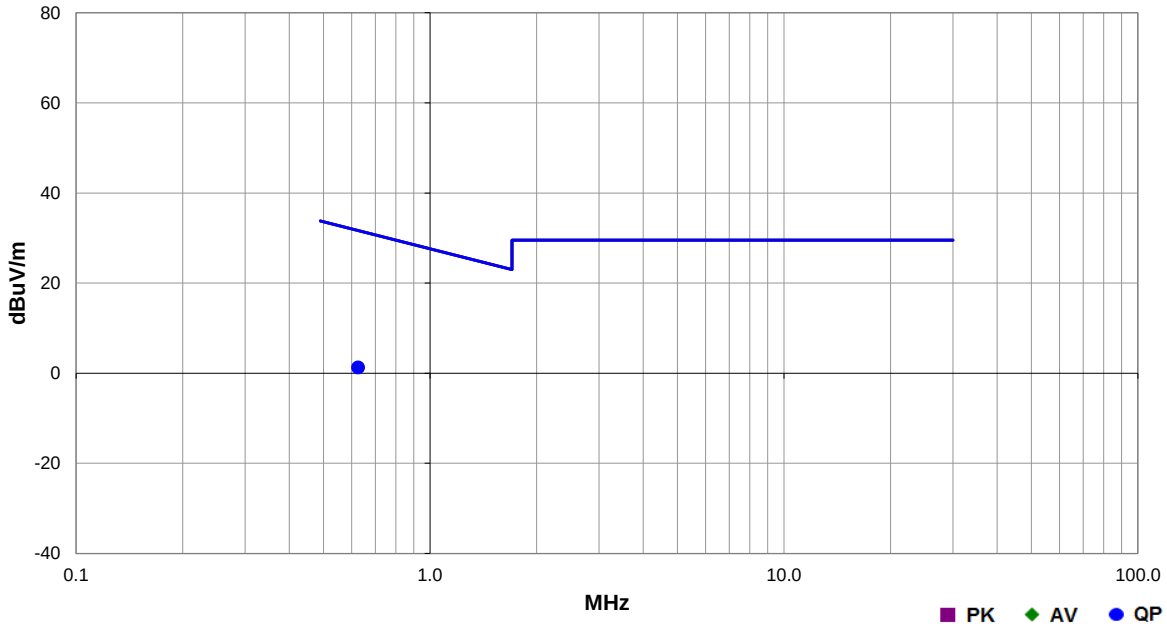
SPURIOUS RADIATED EMISSIONS
(LESS THAN 30 MHZ) - FULL BRIDGE, IMMOBILIZER

EmiR5 2021.09.09.0 PSA-ESCI 2021.12.10.0

Work Order:	ENTI0013	**Date:**	2022-01-03		
Project:	None	**Temperature:**	16.7 °C		
Job Site:	OC10	**Humidity:**	41.7% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1026 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	9				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz. Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo.				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. Worst case from Field Strength of Fundamental: (Perp to EUT, EUT On Side).				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	25	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
0.626	30.7	10.6	1.0	150.0	3.0	0.0	Perp to EUT	QP	-40.0	1.3	31.7	-30.4	Tx, 125 kHz, EUT On Side

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - HALF BRIDGE, SINGLE CH

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Half Bridge. Test Mode: Single Channel PEPS on BCM Antenna PINS 01&01R

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

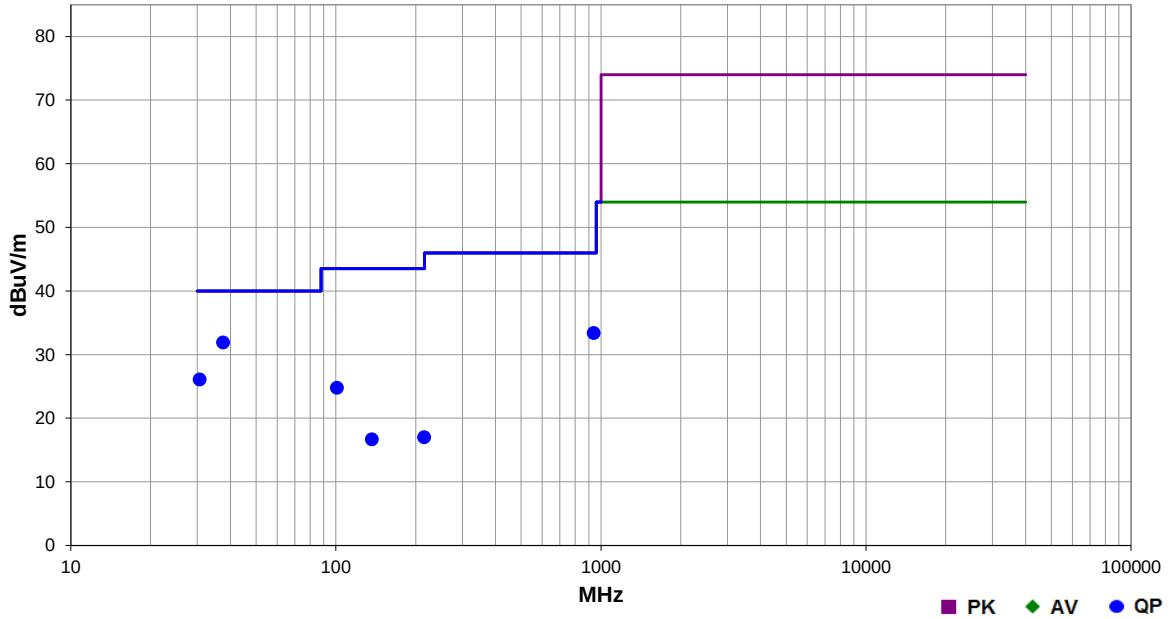
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - HALF BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-04		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	30.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1031 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	2				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Half Bridge. Test Mode: Single Channel PEPS on BCM Antenna PINS 01&01R				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	47	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
37.510	22.3	9.6	1.0	78.0	3.0	0.0	Vert	QP	0.0	31.9	40.0	-8.1
938.160	14.6	18.8	2.0	60.0	3.0	0.0	Horz	QP	0.0	33.4	46.0	-12.6
30.605	14.1	12.0	1.0	166.0	3.0	0.0	Horz	QP	0.0	26.1	40.0	-13.9
100.831	24.6	0.2	1.0	203.0	3.0	0.0	Vert	QP	0.0	24.8	43.5	-18.7
215.013	14.5	2.5	2.0	328.0	3.0	0.0	Horz	QP	0.0	17.0	43.5	-26.5
136.601	14.2	2.5	1.5	54.0	3.0	0.0	Vert	QP	0.0	16.7	43.5	-26.8

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - HALF BRIDGE, DUAL CH

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

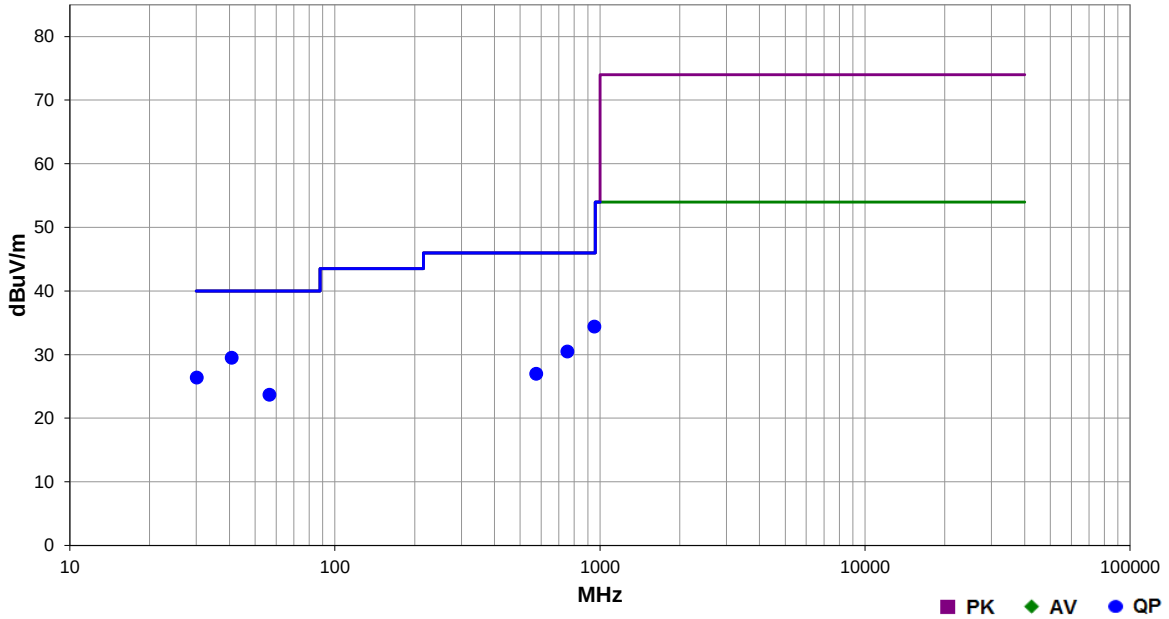
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - HALF BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-02		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	34.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	3				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Half Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins 01&01R and 02&02R				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	33	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
40.757	21.4	8.1	1.0	243.0	3.0	0.0	Vert	QP	0.0	29.5	40.0	-10.5
952.015	14.9	19.5	3.87	58.0	3.0	0.0	Vert	QP	0.0	34.4	46.0	-11.6
30.128	14.2	12.2	3.82	116.0	3.0	0.0	Vert	QP	0.0	26.4	40.0	-13.6
753.282	15.1	15.4	1.0	29.0	3.0	0.0	Horz	QP	0.0	30.5	46.0	-15.5
56.642	22.9	0.8	1.0	197.0	3.0	0.0	Vert	QP	0.0	23.7	40.0	-16.3
574.425	14.7	12.3	1.81	360.0	3.0	0.0	Horz	QP	0.0	27.0	46.0	-19.0

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - ROUND ROBIN

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Half Bridge. Test Mode: Round Robin

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 10

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

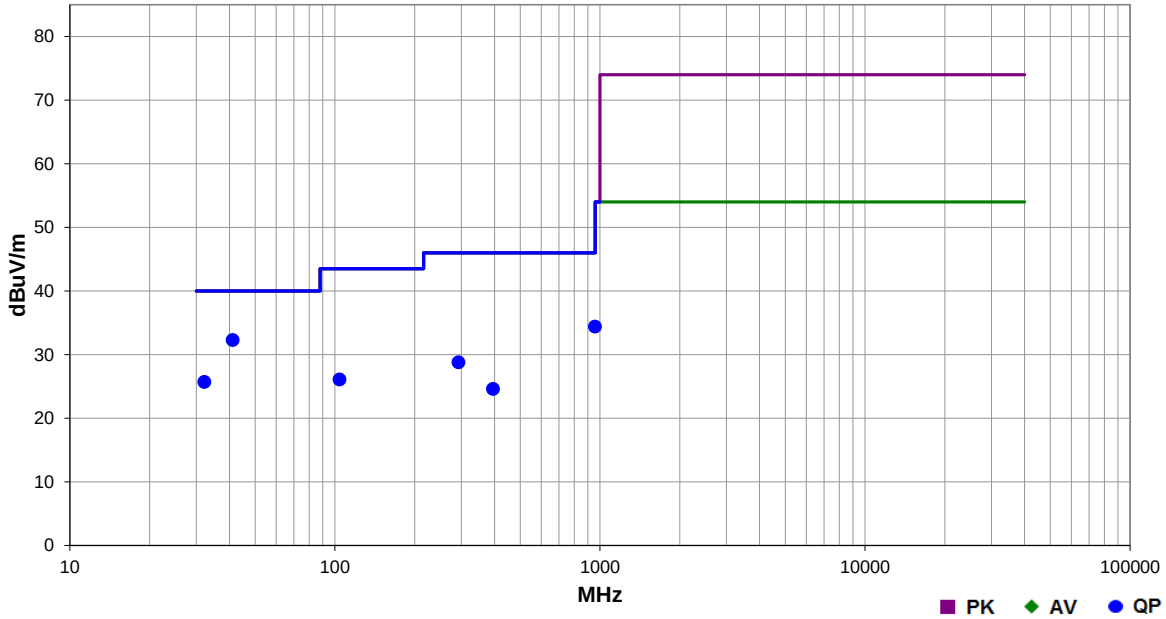
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - ROUND ROBIN

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-02		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	34.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	10				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Half Bridge. Test Mode: Round Robin				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing. During Round Robin mode, each antenna pin will transmit if an antenna is connected. Hence only 1 antenna was terminated during field strength testing in order to determine worst case pin (IMMO Hi/Lo)				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	37	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
41.155	24.4	7.9	3.8	191.0	3.0	0.0	Horz	QP	0.0	32.3	40.0	-7.7
957.312	14.6	19.8	2.09	277.0	3.0	0.0	Horz	QP	0.0	34.4	46.0	-11.6
32.155	14.2	11.5	1.0	209.0	3.0	0.0	Vert	QP	0.0	25.7	40.0	-14.3
292.396	25.1	3.7	1.0	200.0	3.0	0.0	Horz	QP	0.0	28.8	46.0	-17.2
104.023	25.4	0.7	1.0	115.0	3.0	0.0	Vert	QP	0.0	26.1	43.5	-17.4
394.542	17.1	7.5	1.5	109.0	3.0	0.0	Horz	QP	0.0	24.6	46.0	-21.4

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, SINGLE CH

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna PINS 05&06

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 6

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

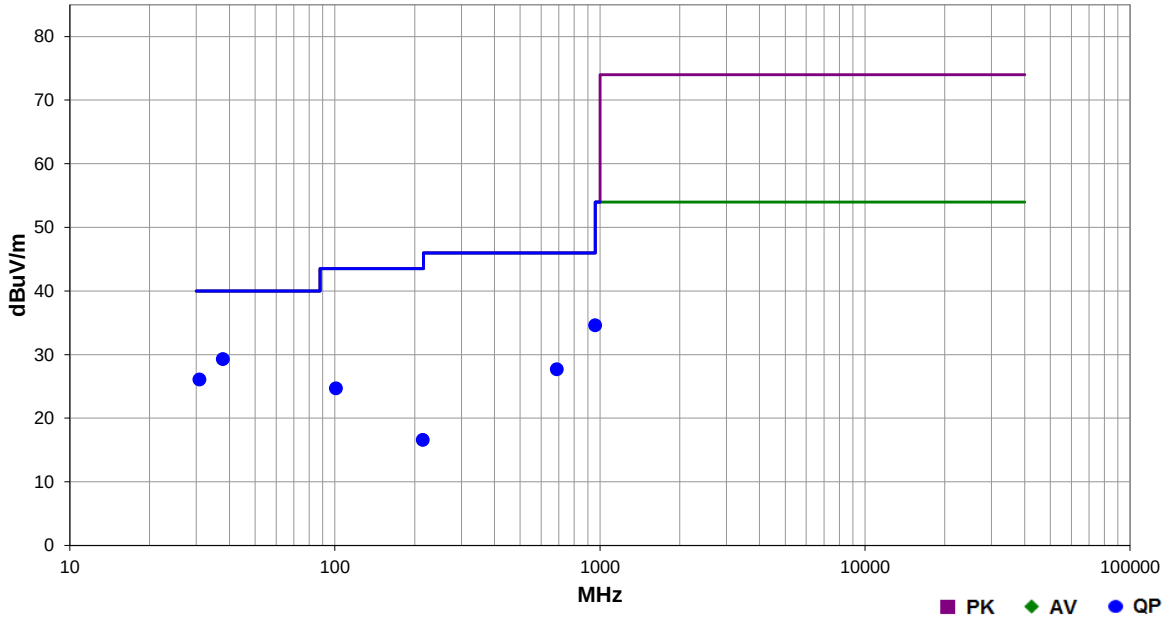
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, SINGLE CH

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-04		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	30.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1031 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	6				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna PINS 05&06				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	48	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
37.758	19.8	9.5	1.0	29.0	3.0	0.0	Vert	QP	0.0	29.3	40.0	-10.7
958.981	14.7	19.9	2.8	2.0	3.0	0.0	Horz	QP	0.0	34.6	46.0	-11.4
30.809	14.1	12.0	1.5	347.0	3.0	0.0	Horz	QP	0.0	26.1	40.0	-13.9
686.765	14.5	13.2	1.5	221.0	3.0	0.0	Vert	QP	0.0	27.7	46.0	-18.3
100.794	24.5	0.2	1.5	132.0	3.0	0.0	Vert	QP	0.0	24.7	43.5	-18.8
214.541	14.1	2.5	1.5	360.0	3.0	0.0	Vert	QP	0.0	16.6	43.5	-26.9

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, SINGLE CH PEPS IMMO

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna IMMO Hi/Lo

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

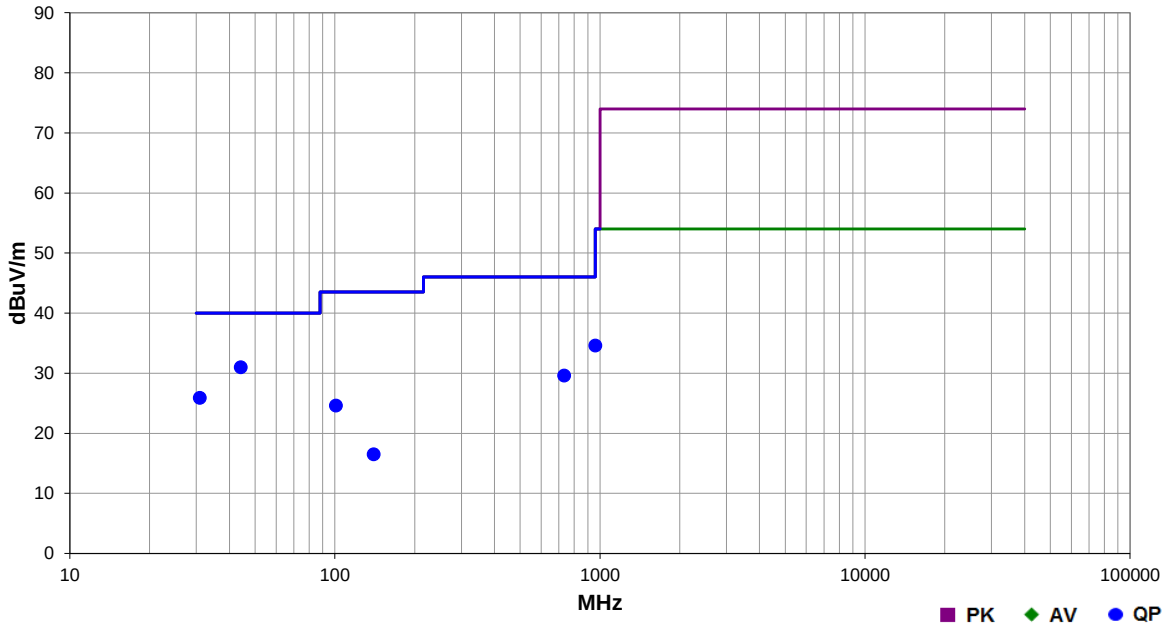
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, SINGLE CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-04		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	30.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1031 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	4				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Single Channel PEPS on BCM Antenna IMMO Hi/Lo				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	49	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
44.130	24.6	6.4	1.0	95.0	3.0	0.0	Vert	QP	0.0	31.0	40.0	-9.0
959.656	14.7	19.9	2.8	300.0	3.0	0.0	Horz	QP	0.0	34.6	46.0	-11.4
30.904	13.9	12.0	1.0	36.0	3.0	0.0	Vert	QP	0.0	25.9	40.0	-14.1
732.480	14.8	14.8	2.8	266.0	3.0	0.0	Vert	QP	0.0	29.6	46.0	-16.4
100.813	24.4	0.2	1.11	16.0	3.0	0.0	Vert	QP	0.0	24.6	43.5	-18.9
140.048	14.0	2.5	3.8	286.0	3.0	0.0	Vert	QP	0.0	16.5	43.5	-27.0

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, DUAL CH

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna 03&04 and 05&06

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 7

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

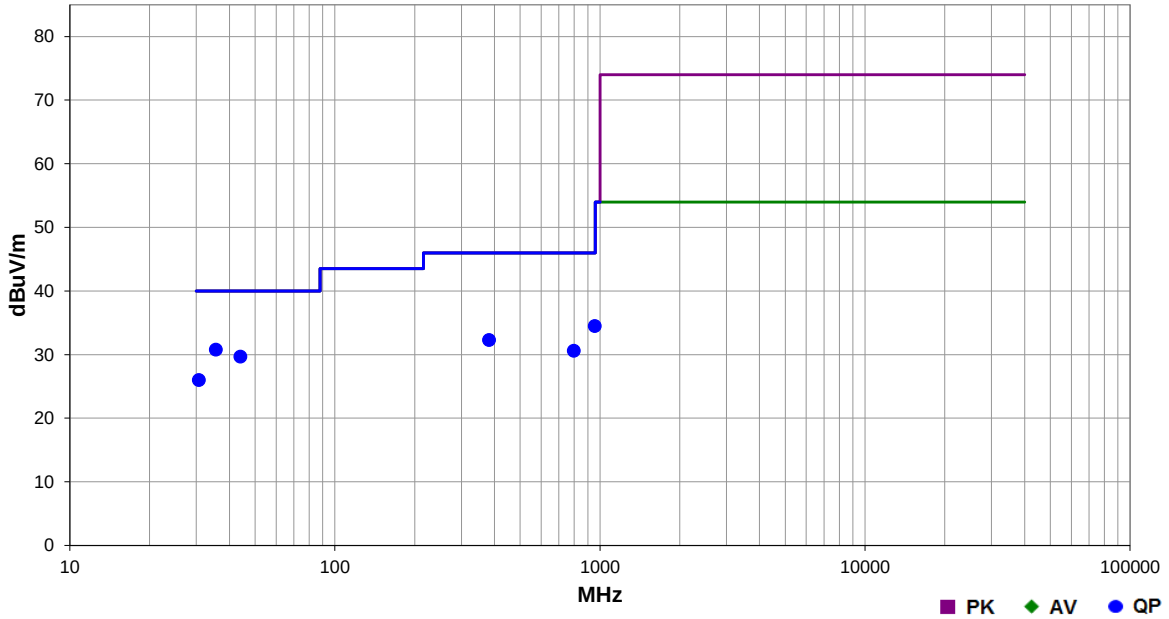
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, DUAL CH

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-04		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	30.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1031 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	7				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna 03&04 and 05&06				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	50	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
35.517	20.3	10.5	2.0	50.0	3.0	0.0	Vert	QP	0.0	30.8	40.0	-9.2
44.014	23.2	6.5	1.0	97.0	3.0	0.0	Vert	QP	0.0	29.7	40.0	-10.3
955.297	14.8	19.7	3.95	297.0	3.0	0.0	Vert	QP	0.0	34.5	46.0	-11.5
381.639	25.6	6.7	2.51	343.0	3.0	0.0	Horz	QP	0.0	32.3	46.0	-13.7
30.671	14.1	11.9	3.81	91.0	3.0	0.0	Horz	QP	0.0	26.0	40.0	-14.0
796.413	15.0	15.6	1.5	20.0	3.0	0.0	Horz	QP	0.0	30.6	46.0	-15.4

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, DUAL CH PEPS IMMO

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo and 03&04

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 8

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

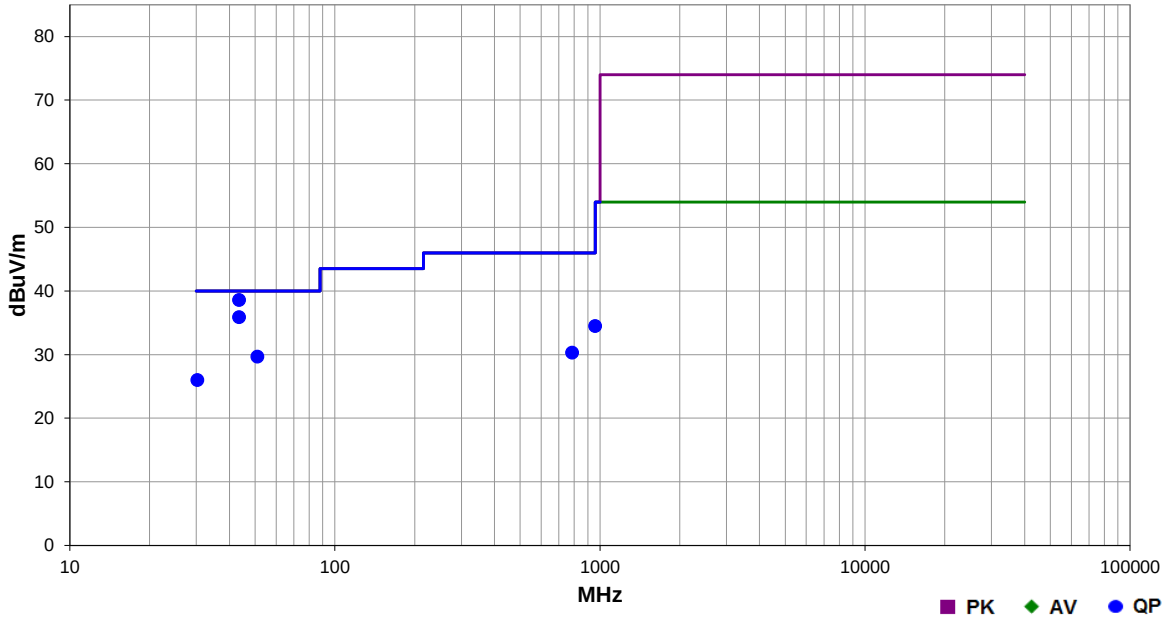
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, DUAL CH PEPS IMMO

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-02		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	34.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	8				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Dual Channel PEPS on BCM Antenna Pins IMMO Hi/Lo and 03&04				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	34	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
43.515	31.9	6.7	1.0	122.0	3.0	0.0	Vert	QP	0.0	38.6	40.0	-1.4
43.512	29.2	6.7	1.0	228.0	3.0	0.0	Vert	QP	0.0	35.9	40.0	-4.1
50.987	26.6	3.1	1.0	62.0	3.0	0.0	Vert	QP	0.0	29.7	40.0	-10.3
958.944	14.6	19.9	1.5	241.0	3.0	0.0	Vert	QP	0.0	34.5	46.0	-11.5
30.246	13.9	12.1	1.0	138.0	3.0	0.0	Horz	QP	0.0	26.0	40.0	-14.0
784.322	14.9	15.4	3.8	8.0	3.0	0.0	Horz	QP	0.0	30.3	46.0	-15.7

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, APPROACH

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, and 05&06

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

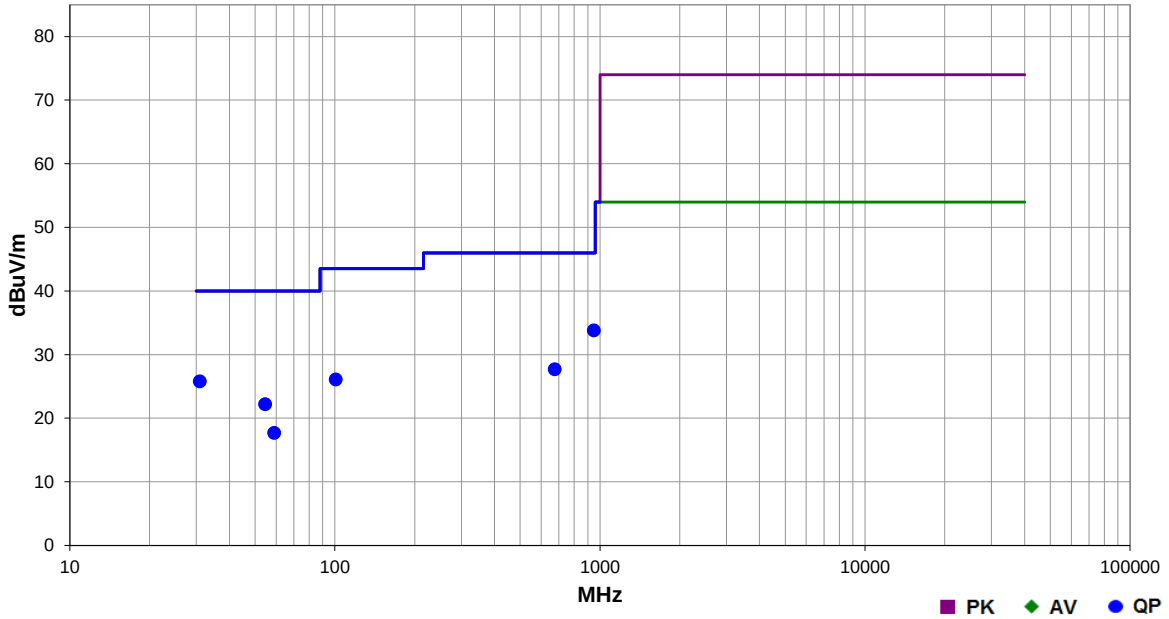
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, APPROACH

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-02		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	34.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	5				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Approach on BCM Antenna Pins 01&02, 03&04, and 05&06				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	35	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
947.150	14.6	19.2	1.0	167.0	3.0	0.0	Vert	QP	0.0	33.8	46.0	-12.2
30.925	13.9	11.9	2.8	66.0	3.0	0.0	Horz	QP	0.0	25.8	40.0	-14.2
100.692	25.9	0.2	1.0	215.0	3.0	0.0	Vert	QP	0.0	26.1	43.5	-17.4
54.500	20.8	1.4	1.0	180.0	3.0	0.0	Vert	QP	0.0	22.2	40.0	-17.8
675.187	14.5	13.2	2.82	221.0	3.0	0.0	Vert	QP	0.0	27.7	46.0	-18.3
59.015	17.8	-0.1	1.0	194.0	3.0	0.0	Vert	QP	0.0	17.7	40.0	-22.3

SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, IMMOBILIZER

PSA-ESCI 2022.1.12.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 125 kHz, Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ENTI0013 - 9

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	2000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Cernex	CBL01084020-xx	PAX	2021-10-12	2022-10-12
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	2021-10-12	2022-10-12
Antenna - Double Ridge	EMCO	3115	AHB	2020-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	2021-10-12	2022-10-12
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	2021-10-12	2022-10-12
Antenna - Biconilog	Teseq	CBL 6141A	AYE	2020-05-06	2022-05-06
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2022-01-12	2023-01-12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

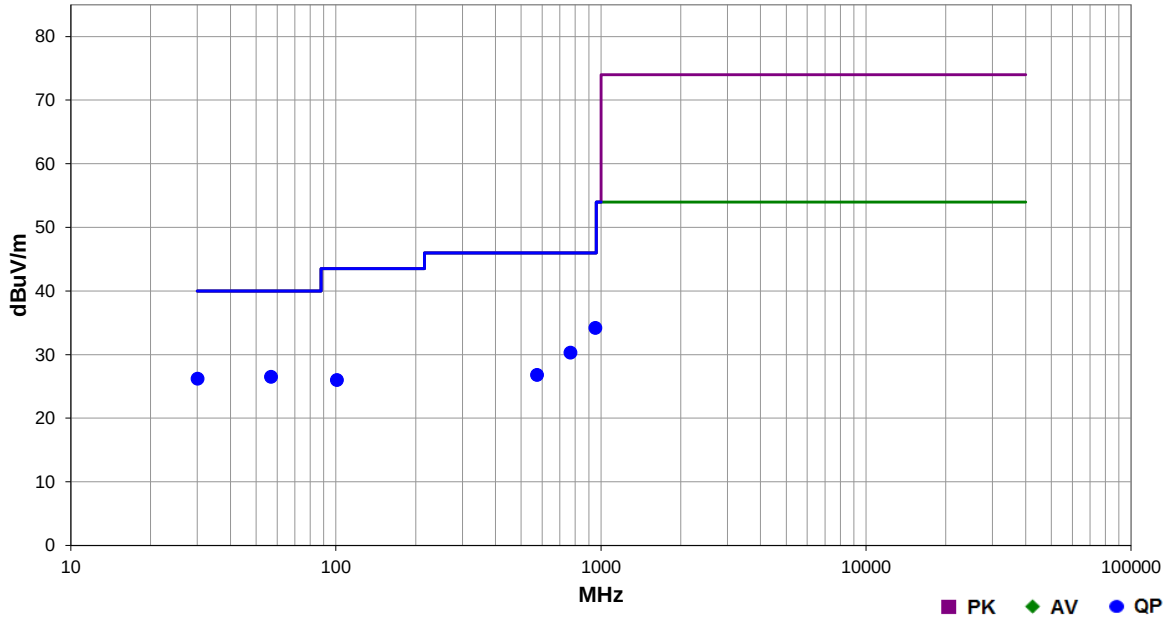
SPURIOUS RADIATED EMISSIONS (GREATER THAN 30 MHZ) - FULL BRIDGE, IMMOBILIZER

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	ENTI0013	**Date:**	2022-02-02		
Project:	None	**Temperature:**	18.4 °C		
Job Site:	OC10	**Humidity:**	34.4% RH		
Serial Number:	See Configuration	**Barometric Pres.:**	1018 mbar	**Tested by:**	Nolan De Ramos, Vincent Liwag
EUT:	B2NA0				
Configuration:	9				
Customer:	DENSO International America, Inc.				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Transmitting 125 kHz, Full Bridge. Test Mode: Immobilizer on BCM Antenna Pins IMMO Hi/Lo				
Deviations:	None				
Comments:	Data presented are the worst case modes as determined during pre compliance testing.				

Test Specifications	**Test Method**
FCC 15.209:2022	ANSI C63.10:2013

Run #	36	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
951.859	14.7	19.5	3.62	141.0	3.0	0.0	Horz	QP	0.0	34.2	46.0	-11.8
56.906	25.8	0.7	1.0	163.0	3.0	0.0	Vert	QP	0.0	26.5	40.0	-13.5
30.049	14.0	12.2	1.0	45.0	3.0	0.0	Horz	QP	0.0	26.2	40.0	-13.8
767.335	14.8	15.5	2.4	280.0	3.0	0.0	Horz	QP	0.0	30.3	46.0	-15.7
100.832	25.8	0.2	1.0	182.0	3.0	0.0	Vert	QP	0.0	26.0	43.5	-17.5
574.199	14.5	12.3	2.0	27.0	3.0	0.0	Vert	QP	0.0	26.8	46.0	-19.2

End of Test Report