

APPENDIX 2: Data of EMI test

Radiated Emission
[TYPE 1]

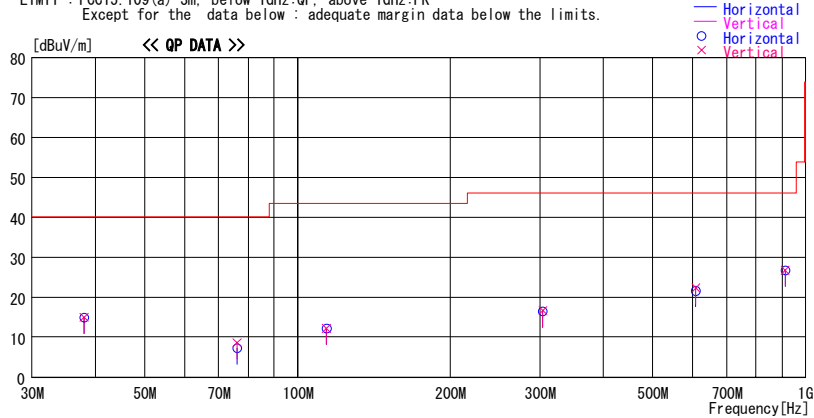
DATA OF RADIATED EMISSION TEST

UL Japan Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2008/05/19

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE(Type 1)
Serial No. : 001
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg. C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBUV]		[dB/m]	[dB]	[dBUV/m]	[Deg]	[cm]		[dBUV/m]	[dB]
38.035	22.2	QP	14.6	-21.9	14.9	0	100	Hori.	40.0	25.1
38.035	22.2	QP	14.6	-21.9	14.9	0	100	Vert.	40.0	25.1
76.070	22.1	QP	6.5	-21.4	7.2	0	100	Hori.	40.0	32.8
76.070	23.4	QP	6.5	-21.4	8.5	0	100	Vert.	40.0	31.5
114.105	21.7	QP	11.3	-20.9	12.1	0	100	Hori.	43.5	31.4
114.105	21.8	QP	11.3	-20.9	12.2	0	100	Vert.	43.5	31.3
304.280	21.0	QP	14.5	-19.0	16.5	0	100	Hori.	46.0	29.5
304.280	21.1	QP	14.5	-19.0	16.6	0	100	Vert.	46.0	29.4
608.560	20.9	QP	19.4	-18.7	21.6	0	100	Hori.	46.0	24.4
608.560	21.6	QP	19.4	-18.7	22.3	0	100	Vert.	46.0	23.7
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Vert.	46.0	19.3
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Hori.	46.0	19.3

CHART:WITH FACTOR ANT TYPE : -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz--:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 2] (Reference data)

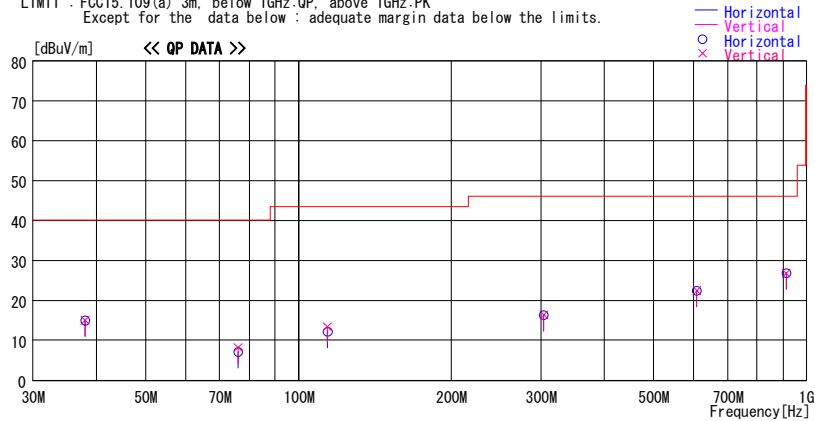
DATA OF RADIATED EMISSION TEST

UL Japan Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/05/19

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE(Type 2)
Serial No. : 002
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg. C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m. below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
38.035	22.3	QP	14.6	-21.9	15.0	0	100	Hori.	40.0	25.0
38.035	22.3	QP	14.6	-21.9	15.0	0	100	Vert.	40.0	25.0
76.070	22.0	QP	6.5	-21.4	7.1	0	100	Hori.	40.0	32.9
76.070	23.1	QP	6.5	-21.4	8.2	0	100	Vert.	40.0	31.8
114.105	21.7	QP	11.3	-20.9	12.1	0	100	Hori.	43.5	31.4
114.105	23.0	QP	11.3	-20.9	13.4	0	100	Vert.	43.5	30.1
304.280	20.9	QP	14.5	-19.0	16.4	0	100	Hori.	46.0	29.7
304.280	20.9	QP	14.5	-19.0	16.4	0	100	Vert.	46.0	29.6
608.560	21.7	QP	19.4	-18.7	22.4	0	100	Hori.	46.0	23.6
608.560	21.7	QP	19.4	-18.7	22.4	0	100	Vert.	46.0	23.6
912.840	21.4	QP	22.0	-16.6	26.8	0	100	Vert.	46.0	19.2
912.840	21.4	QP	22.0	-16.6	26.8	0	100	Hori.	46.0	19.2

CHART WITH FACTOR ANT TYPE : -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 3] (Reference data)

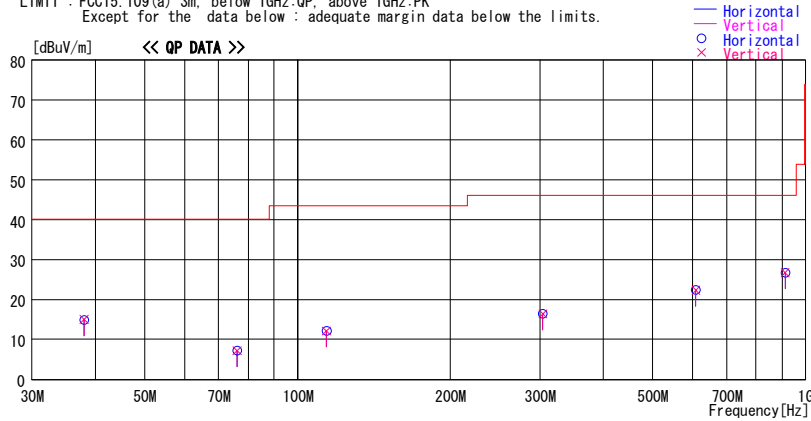
DATA OF RADIATED EMISSION TEST

UL Japan Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/05/19

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE(Type 3)
Serial No. : 003
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg.C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
38.035	22.2	QP	14.6	-21.9	14.9	0	100	Hori.	40.0	25.1
38.035	22.3	QP	14.6	-21.9	15.0	0	100	Vert.	40.0	25.0
76.070	22.1	QP	6.5	-21.4	7.2	0	100	Hori.	40.0	32.8
76.070	22.1	QP	6.5	-21.4	7.2	0	100	Vert.	40.0	32.8
114.105	21.7	QP	11.3	-20.9	12.1	0	100	Hori.	43.5	31.4
114.105	21.7	QP	11.3	-20.9	12.1	0	100	Vert.	43.5	31.4
304.280	20.9	QP	14.5	-19.0	16.4	0	100	Hori.	46.0	29.6
304.280	20.9	QP	14.5	-19.0	16.4	0	100	Vert.	46.0	29.6
608.560	21.7	QP	19.4	-18.7	22.4	0	100	Hori.	46.0	23.6
608.560	21.6	QP	19.4	-18.7	22.3	0	100	Vert.	46.0	23.7
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Vert.	46.0	19.3
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Hori.	46.0	19.3

CHART WITH FACTOR ANT TYPE : -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz:-HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 4] (Reference data)

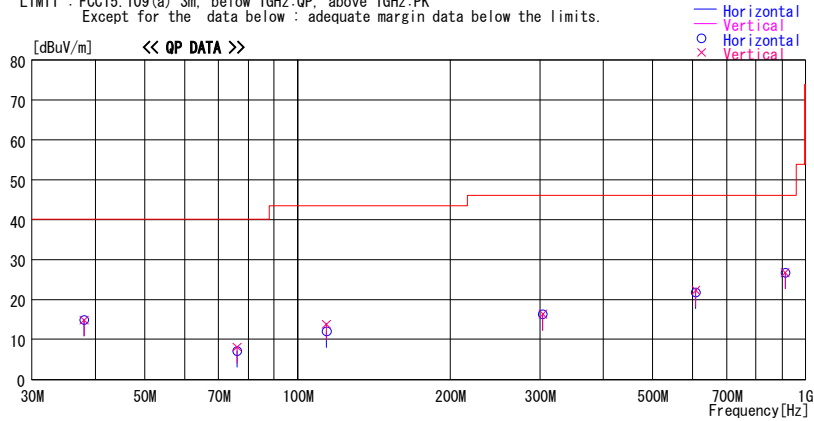
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/06/03

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE(Type 4)
Serial No. : 004
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 22deg.C / 68%
Operator : Akio Hayashi

Mode / Remarks : Recieving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
38.035	22.2	QP	14.6	-21.9	14.9	0	100	Vert.	40.0	25.1
38.035	22.1	QP	14.6	-21.9	14.8	0	300	Hori.	40.0	25.2
76.070	23.0	QP	6.5	-21.4	8.1	300	153	Vert.	40.0	31.9
76.070	22.0	QP	6.5	-21.4	7.1	0	300	Hori.	40.0	32.9
114.105	21.7	QP	11.3	-20.9	12.1	0	300	Hori.	43.5	31.4
114.105	23.4	QP	11.3	-20.9	13.8	215	100	Vert.	43.5	29.7
304.280	20.8	QP	14.5	-19.0	16.3	0	100	Vert.	46.0	29.7
304.280	20.8	QP	14.5	-19.0	16.3	0	100	Hori.	46.0	29.7
608.560	21.6	QP	19.4	-18.7	22.3	0	100	Vert.	46.0	23.7
608.560	21.1	QP	19.4	-18.7	21.8	0	100	Hori.	46.0	24.2
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Vert.	46.0	19.3
912.840	21.3	QP	22.0	-16.6	26.7	0	100	Hori.	46.0	19.3

CHART WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz:-HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 1]

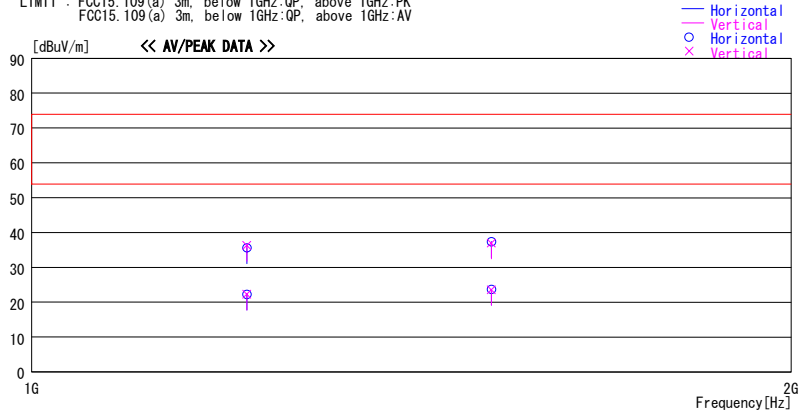
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/05/20

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE (Type 1)
Serial No. : 001
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg. C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
1217.120	42.3	PK	24.8	-31.4	35.7	0	100	Hori.	73.9	38.2
1217.120	28.9	AV	24.8	-31.4	22.3	0	100	Hori.	53.9	31.6
1217.120	42.9	PK	24.8	-31.4	36.3	0	100	Vert.	73.9	37.6
1217.120	28.9	AV	24.8	-31.4	22.3	0	100	Vert.	53.9	31.6
1521.400	42.9	PK	25.2	-30.7	37.4	0	100	Hori.	73.9	36.5
1521.400	29.2	AV	25.2	-30.7	23.7	0	100	Hori.	53.9	30.2
1521.400	42.5	PK	25.2	-30.7	37.0	0	100	Vert.	73.9	36.9
1521.400	29.1	AV	25.2	-30.7	23.6	0	100	Vert.	53.9	30.3

CHART: WITH FACTOR ANT TYPE : -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 2] (Reference data)

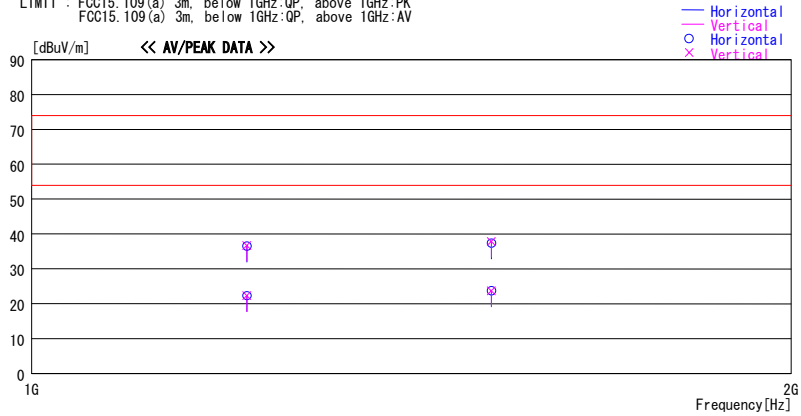
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/05/20

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE (Type 2)
Serial No. : 002
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg. C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	
			Factor [dB]	Loss& Gain [dB]					[dBuV/m]	[dB]
1217.120	43.2	PK	24.8	-31.4	36.6	0	100	Hori.	73.9	37.3
1217.120	29.0	AV	24.8	-31.4	22.4	0	100	Hori.	53.9	31.5
1217.120	43.3	PK	24.8	-31.4	36.7	0	100	Vert.	73.9	37.2
1217.120	28.9	AV	24.8	-31.4	22.3	0	100	Vert.	53.9	31.6
1521.400	43.0	PK	25.2	-30.7	37.5	0	100	Hori.	73.9	36.4
1521.400	29.2	AV	25.2	-30.7	23.7	0	100	Hori.	53.9	30.2
1521.400	43.4	PK	25.2	-30.7	23.7	0	100	Vert.	73.9	36.0
1521.400	29.2	AV	25.2	-30.7	37.9	0	100	Vert.	53.9	30.2

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 3] (Reference data)

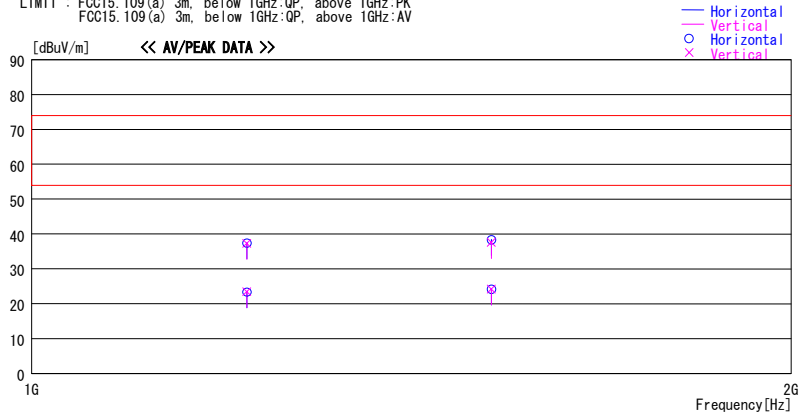
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/05/20

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE (Type 3)
Serial No. : 003
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 23deg.C / 69%
Operator : Kazuya Yoshioka

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	
			Factor [dB/m]	Gain [dB]					[dBuV/m]	[dB]
1217.120	44.1	PK	24.8	-31.4	37.5	0	100	Hori.	73.9	36.4
1217.120	30.0	AV	24.8	-31.4	23.4	0	100	Hori.	53.9	30.5
1217.120	43.9	PK	24.8	-31.4	37.3	0	100	Vert.	73.9	36.6
1217.120	30.1	AV	24.8	-31.4	23.5	0	100	Vert.	53.9	30.4
1521.400	43.9	PK	25.2	-30.7	38.4	0	100	Hori.	73.9	35.5
1521.400	29.7	AV	25.2	-30.7	24.2	0	100	Hori.	53.9	29.7
1521.400	43.1	PK	25.2	-30.7	37.6	0	100	Vert.	73.9	36.3
1521.400	29.7	AV	25.2	-30.7	24.2	0	100	Vert.	53.9	29.7

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
[TYPE 4] (Reference data)

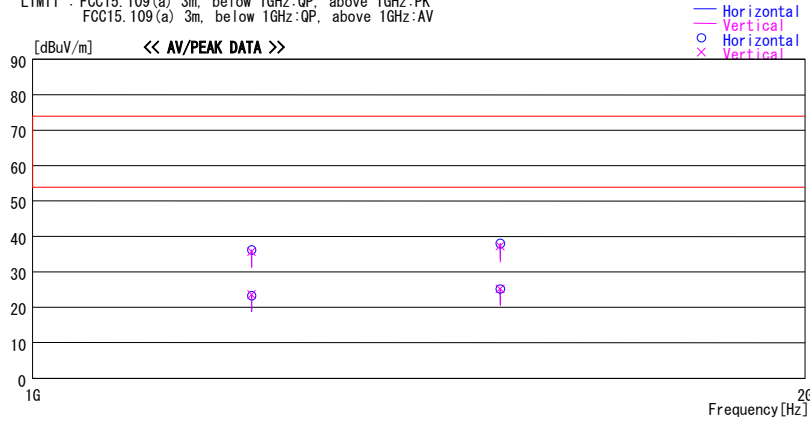
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2008/06/03

Company : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System (Receiver)
Model No. : 13BDE (Type 4)
Serial No. : 004
Report No. : 28JE0021-HO-01
Power : DC 5.0V
Temp./Humi. : 22deg.C / 68%
Operator : Akio Hayashi

Mode / Remarks : Receiving Mode Hor:X Ver:X

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss & Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
1217.120	42.8	PK	24.8	-31.4	36.2	0	100	Hori.	73.9	37.7	
1217.120	29.9	AV	24.8	-31.4	23.3	0	100	Hori.	53.9	30.6	
1217.120	42.3	PK	24.8	-31.4	35.7	0	100	Vert.	73.9	38.2	
1217.120	30.2	AV	24.8	-31.4	23.6	0	100	Vert.	53.9	30.3	
1521.400	43.5	PK	25.2	-30.7	38.0	0	100	Hori.	73.9	35.9	
1521.400	30.7	AV	25.2	-30.7	25.2	0	100	Hori.	53.9	28.7	
1521.400	42.8	PK	25.2	-30.7	37.3	0	100	Vert.	73.9	36.6	
1521.400	30.7	AV	25.2	-30.7	25.2	0	100	Vert.	53.9	28.7	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

APPENDIX 3: Test instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2008/04/17 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800	RE	-
MJM-05	Measure	PROMART	SEN1955	RE	-
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE	-
MRENT-62	Spectrum Analyzer	Agilent	E4448A	RE	2007/11/27 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	RE	2008/04/02 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/10/21 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2007/10/21 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2008/02/15 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2007/11/13 * 12
MPA-09	Pre Amplifier	Agilent	8447D	RE	2007/09/13 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2008/01/19 * 12
MCC-47	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2008/05/12 * 12
MPA-10	Pre Amplifier	Agilent	8449B	RE	2007/09/27 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission

UL Japan, Inc.

Head Office EMC Lab.

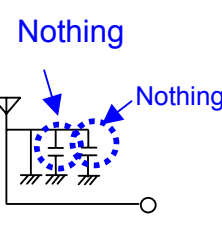
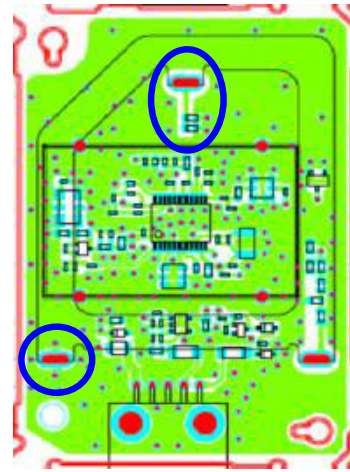
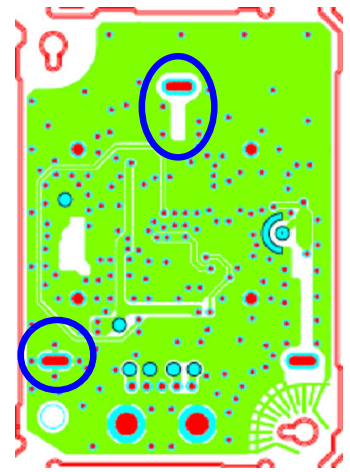
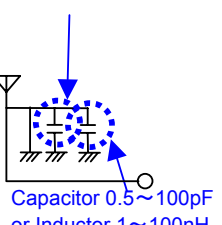
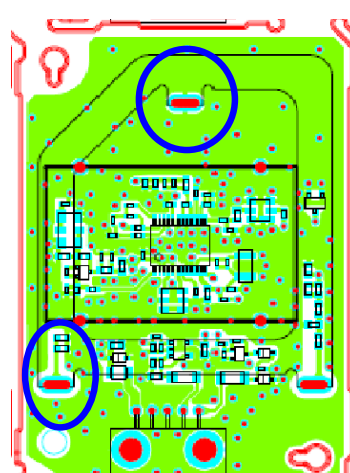
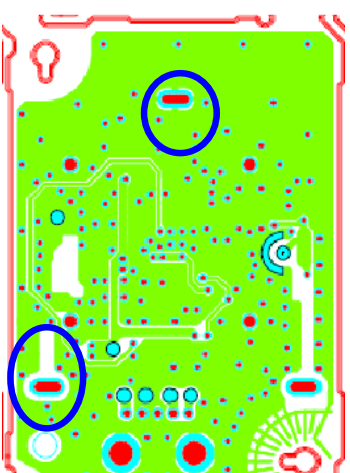
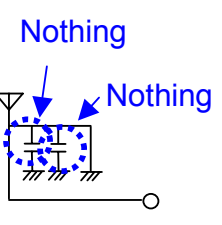
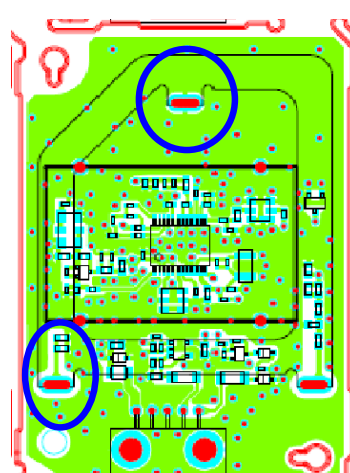
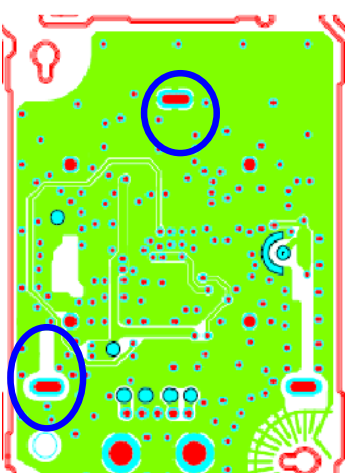
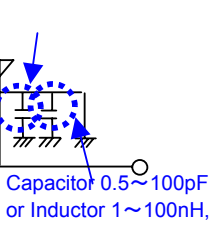
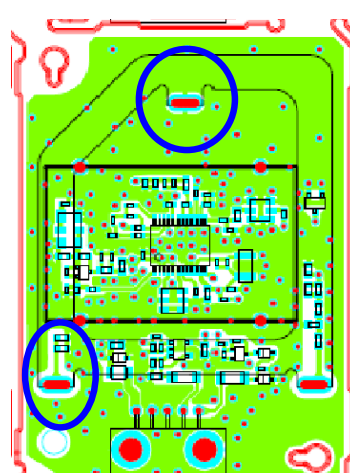
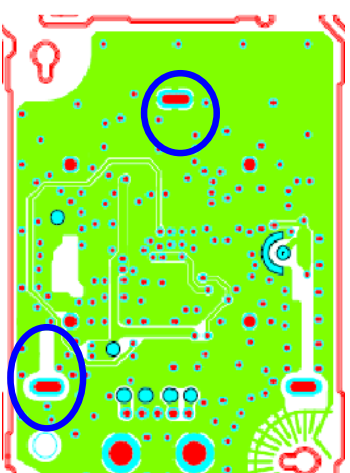
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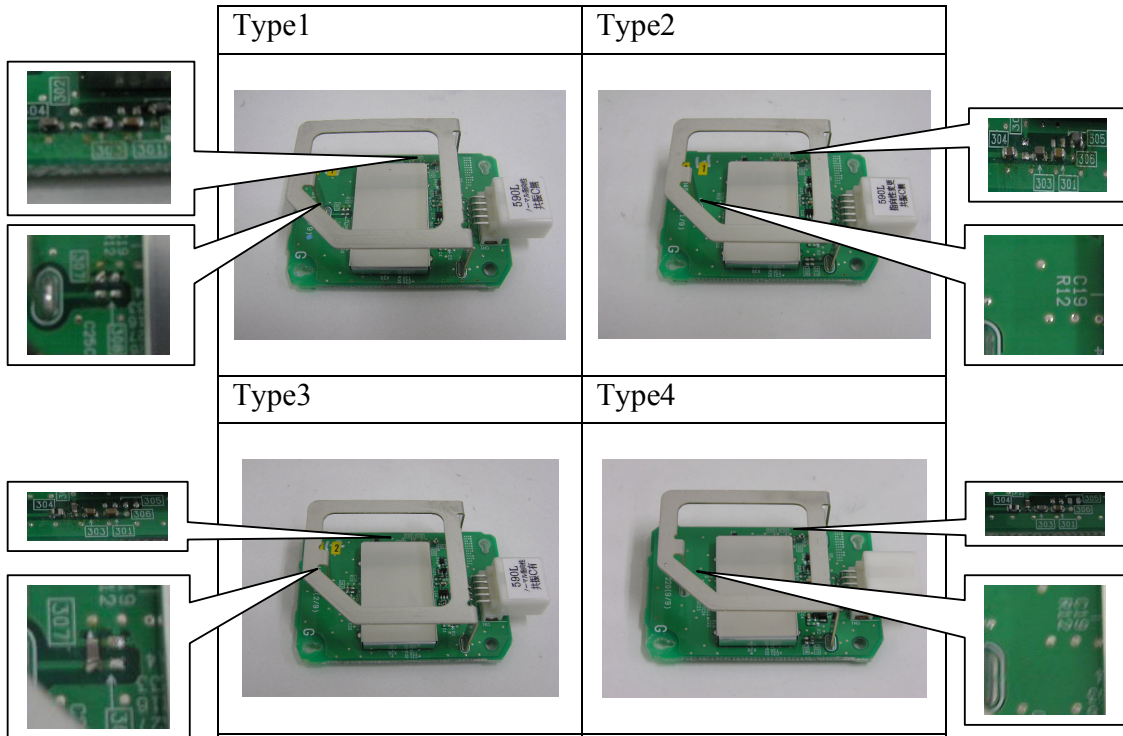
Facsimile : +81 596 24 8124

APPENDIX 4: Information of Type 1 to 4

Differences are shown in circle ○.

Type		Component Side	Solder Side
TYPE 1	<p>Nothing</p> 		
TYPE 3	<p>Capacitor 0.5~100pF or Inductor 1~100nH</p> 		
TYPE 2	<p>Nothing</p> 		
TYPE 4	<p>Capacitor 0.5~100pF or Inductor 1~100nH</p> 		

Photos of variations



Difference between Type 1 and Type 2
 Ground points are different.

Difference between Type 1 and Type 3
 Type 1 has vacant terminals, and Type 3 has elements on them.

Difference between Type 1 and Type 4
 Ground points are different.
 Type 1 has vacant terminals, and Type 4 has elements on them.

*Remarks:
 Difference between Type 3 and Type 4
 Ground points are different.