RF Exposure Evaluation Report

FOR:

Model Name: TL2603GR, 3G2060R, TL2603G, 3G2060

Alarm communicator for DSC Power Series Panels

FCC ID: F53123G260R
IC ID: 160A-3G260R

References:

1. FCC OET Bulletin 65 Supplement C
2. FCC CFR Part 2
3. RSS-102- Radio Frequency Exposure Compliance of Radiocommunication Apparatus Issue 4 March 2010

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Director:	Heiko Strehlow
Responsible Project Leader:	Tunji Yusuf

1.2 Identification of the Client

Applicant's Name:	Tyco Safety Products
Street Address:	3301 Langstaff Road
City/Zip Code	Concord ON L4K 4L2
Country	Canada
Contact Person:	Dan Nita
Phone No.	905-760-3000
Fax:	905-760-3020
e-mail:	dnita@dsc.com

1.3 Identification of the Manufacturer

Manufacturer's Name:	Same as above
Manufacturers Address:	
City/Zip Code	
Country	

2 Equipment under Test (EUT)

2.1 Specification of the Equipment under Test

Marketing Name:	TL2603GR, 3G2060R, TL2603G, 3G2060
Model No:	TL2603GR, 3G2060R, TL2603G, 3G2060
HW Revision:	UA601 Rev 03
SW Revision:	3.0
FCC-ID:	F53123G260R
IC-ID:	160A-3G260R
Product Description:	Alarm communicator for DSC Power Series Panels, includes IP interface for redundant/back-up communication over 10/100BaseT Ethernet and RS422 Interface for connection to 3rd party equipment.
Frequency Range :	GSM 850: 824.2-848.8MHz; PCS 1900: 1850.2-1909.8MHz FDD V: 826.4-846.6MHz; FDD II: 1852.4-1907.6MHz
Type(s) of Modulation:	GMSK; 8-PSK; QPSK; 16QAM
Antenna Type and Gain:	GSM quad band (824MHz-960MHz, 1710MHz-1990MHz) 1-3dBi Gain
Co-located Transmitters/ Antennas?	☐Yes ■ No
Power supply:	DC Battery (Min: 9.5 Nom: 13.8 Max: 14.5)
Operating temperature range:	-10°C to 55°C
Prototype / Production unit:	Prototype
Device Category:	■ Fixed Installation ☐Mobile ☐ Portable
Exposure Category:	☐ Occupational/ Controlled ■ General Population/ Uncontrolled

3 Assessment

This report serves as the Technical Information regarding RF Exposure evaluation against the requirements in 47 CFR 2.1091and as the RF Exposure Technical Brief according to RSS-102 Ch. 2.2.

The following device has been evaluated and meets/is exempt from the RF Exposure Limits defined in 47 CFR 1.310 and RSS-102 Issue 4 Ch. 4.

Company	Description	Model #
Tyco Safety Products	Alarm communicator for DSC Power Series Panels	TL2603GR, 3G2060R, TL2603G, 3G2060

Date	Section	Name	Signature
2012-04-20	Compliance	Tunji Yusuf	Tunji Yusuf Digitally signed by Tunji Yusuf DN: cn=Tunji Yusuf, c=US, o=CETECOM Inc, ou=Compliance, email=tunji.yusuf@cetecomusa.com Date: 2012.04.20 14:04:03 -07'00'

4 RF Exposure Evaluation Requirements

4.1 FCC:

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document:
"OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields".

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm^2)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Note:
1. This device is to be used only for fixed and mobile applications.
2. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Additionally, according to § 2.1091:
The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP
The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

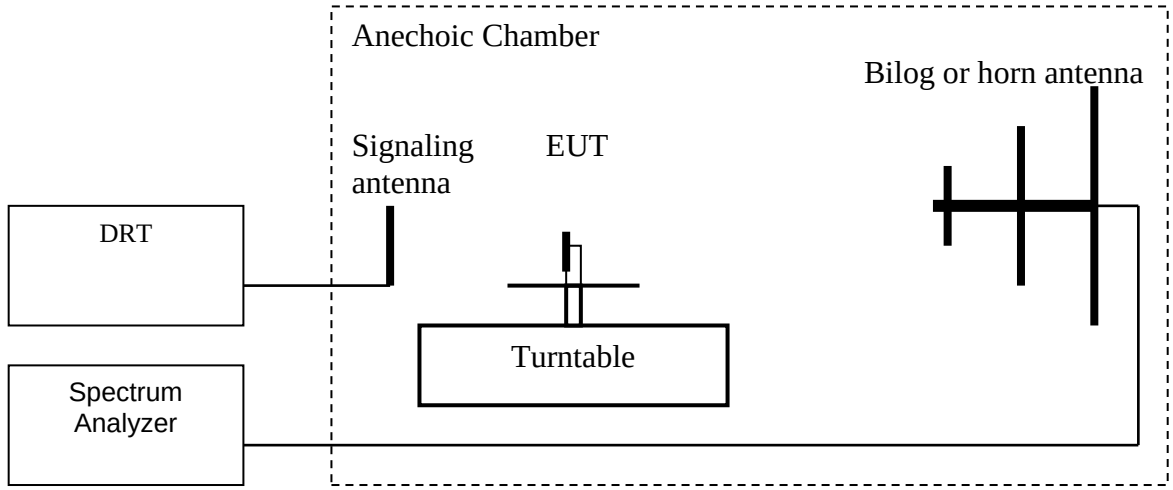
4.2 IC:

RSS-102 Section 2.5.2
RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:
- below 1.5 GHz and the maximum EIRP of the device is equal to or less than 2.5 W;
- at or above 1.5 GHz and the maximum EIRP of the device is equal to or less than 5 W.

RSS-102 4.2: RF Field strength limits for devices used by the General Public (Uncontrolled Environment):
Power density
300MHz- 1500 MHz= f/150 W/m^2
1500 MHz- 1500000 MHz= 10 W/m^2

5 Measurement procedure:

5.1 Radiated power measurement- ERP/EIRP-

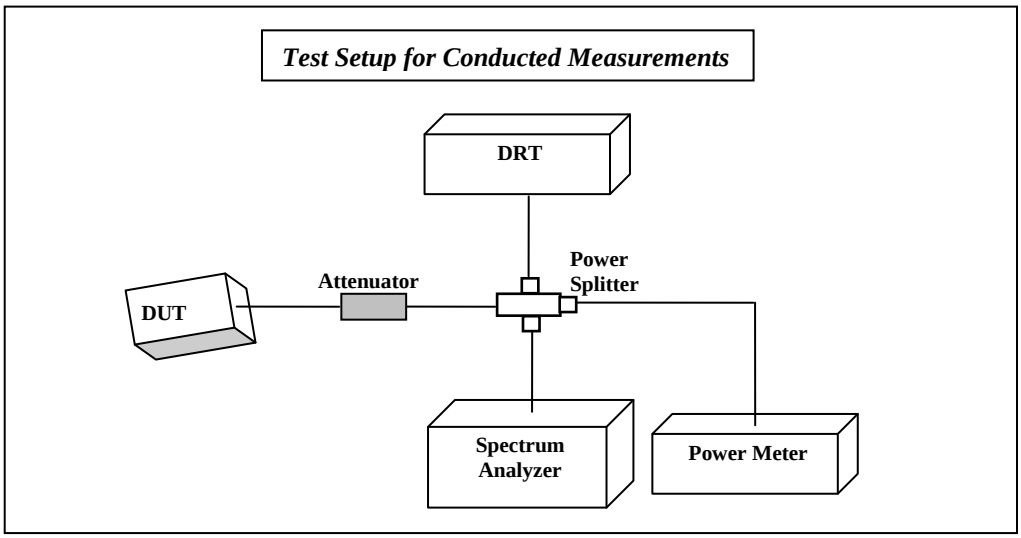


1. Connect the equipment as shown in the above diagram with the EUT's antenna in center of the turn table.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

Measurement uncertainty: +/-3.0 dB

(**Note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

5.2 Radiated power Calculation- ERP/EIRP-



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel (OR) alternatively use the EUT to set to transmit at a specific mode.
3. Measure conducted power using the power meter or the Spectrum Analyzer.
4. ERP/EIRP is calculated by adding the antenna gain to the measured conducted power.
   EIRP= Measured conducted power+ Antenna Gain (dBi)
   (Antenna gain based on measurement or data from the antenna manufacturer.)
   ERP= EIRP- 2.14

5.3 Measurement Equipment information:

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
EMI Receiver/Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2011	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Apr 2012	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Aug 2011	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years

5.4 Measurement Summary:

Band of operation	Peak Radiated Power- EIRP		Limits (IC) (where no routine evaluation is required)	Peak Radiated Power ERP		Limits (FCC) (where no routine evaluation is required)
MHz	dBm	mW	W	dBm	mW	W
GSM/GPR/EDGE 824.2-848.8	36.12	4102	2.5	33.98	2506	1.5
GSM/GPRS/EDGE 1850.2-1909.8	31.21	1324	5	29.07	809.2	3
UMTS FDDV 826.4-846.6MHz	31.24	1333	2.5	29.10	814.7	1.5
UMTS FDDII 1852.4-1907.6MHz	28.79	758.6	5	26.65	463.4	3

Power Density calculation:

Band of operation	Peak Radiated Power- EIRP		Duty Cycle (worst Case)	Distance (R)	Power Density $(EIRP*DutyCycle)/(4\pi R^2)$	Limit	Verdict
	dBm	mW		cm	mW/cm^2	mW/cm^2	
GSM/GPR/EDGE 824.2-848.8	36.12	4102	50%	20	0.41	0.57	Pass
GSM/GPRS/EDGE 1850.2-1909.8	31.21	1324	50%	20	0.13	1	Pass
UMTS FDDV 826.4-846.6MHz	31.24	1333	100%	20	0.27	0.57	Pass
UMTS FDDII 1852.4-1907.6MHz	28.79	758.6	100%	20	0.15	1	Pass

Compliance with MPE limits can be guaranteed as the calculation below shows:

850 MHz frequency band

Maximum output power considerations:

Mode	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty cycle (worst case)	Equivalent conducted output power (Maximum conducted output power x duty cycle) (mW)
GSM	32.40	1737.80	50	868.90
EGPRS	27.22	527.23	50	263.61
UMTS	22.78	189.67	100	189.67

P	Maximum power input to the antenna:	868.90	mW
R	Distance:	20	cm
S	MPE limit for uncontrolled exposure:	0,57	mW/cm^2
G_1	Antenna gain (dBi) to comply with MPE limits:	**5.09**	**dBi**
ERP power limit according to §2.1091:		1,5	W ERP
G_2	Antenna gain (dBi) to comply with ERP limits: (ERP = Equivalent conducted output power x Antenna gain / 1,64)	**4.52**	**dBi**
ERP power limit according to §22.913:		7	W ERP
G_3	Antenna gain (dBi) to comply with ERP limits: (ERP = Maximum conducted output power x Antenna gain / 1,64)	**8.20**	**dBi**
$G_{850\ MHz\ band}$	Min (G_1, G_2, G_3)	**4.52**	**dBi**

Therefore the maximum antenna gain for mobile operation to comply with MPE and ERP limits shall not exceed **4.52 dBi**.

1900 MHz frequency band

Maximum output power considerations:

Mode	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty cycle	Equivalent conducted output power (Maximum conducted output power x duty cycle) (mW)
GSM	28.73	746.45	50	373.22
EGPRS	25.53	357.27	50	178.64
UMTS	22.64	183.65	100	183.65

P	Maximum power input to the antenna:	373.22	mW
R	Distance:	20	cm
S	MPE limit for uncontrolled exposure:	1	mW/cm^2
G_1	Antenna gain (dBi) to comply with MPE limits:	**11.28**	**dBi**
EIRP power limit according to §2.1091:		3	W EIRP
G_2	Antenna gain (dBi) to comply with ERP limits: (EIRP = Equivalent conducted output power x Antenna gain)	**11.20**	**dBi**
EIRP power limit according to §24.232:		2	W EIRP
G_3	Antenna gain (dBi) to comply with EIRP limits: (EIRP = Maximum conducted output power x Antenna gain)	**4.27**	**dBi**
$G_{1900\ MHz\ band}$	Min (G_1, G_2, G_3)	**4.27**	**dBi**

Therefore the maximum antenna gain for mobile operation to comply with MPE and ERP limits shall not exceed **4.27 dBi**.