



The GDCP-XX96-40 series single mode transceiver is small form factor pluggable module for duplex optical data communications. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528nm to 1566nm as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks.

It is with the SFP+ 20-pin connector to allow hot plug capability. The transmitter section uses a DWDM EML laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an APD detector and a limiting post-amplifier IC.

The GDCP-XX96-40 series are designed to be compliant with SFP+ Multi-Source Agreement (MSA) Specification SFF-8431 and 8432.

Features

- Available in all C-Band Wavelengths on the 100GHz
- DWDM ITU Grid
- Temperature-Stabilized DWDM EML Transmitter
- Duplex LC Connector
- Dispersion tolerance from -300ps/nm to 800ps/nm
- Hot-Pluggable SFP+ Footprint
- Compliant with SFF-8431 MSA
- Compliant with SFF-8432 MSA
- Operating Case Temperature:Standard: 0°C to 70°C

Applications

- 10GBASE-ER/EW
- 10G fiber channel
- Other optical links

Order Information

Table 1-order information

Part Number	Bit Rate	Laser (nm)	Distance	Fiber Type	DDMI	Connector	Temp ^{note1}
GDCP-XX96-40 <small>note1</small>	10G	100Ghz DWDM ^{note2}	40km	SMF	YES	LC	0°C~+70°C

Note:1: According to XX ITU CHANNEL. Each table-2 channel code visible wavelength. For example: the complete 17ch model GDCP-1796-40

Wavelength Guide (** value)

Table 2-wavelength guide

ITU channel (**)	Frequency (THz)	Wavelength (nm)	ITU Channel (**)	Frequency (THz)	Wavelength (nm)
17	191.7	1563.863	40	194.0	1545.322
18	191.8	1563.047	41	194.1	1544.526
19	191.9	1562.233	42	194.2	1543.730
20	192.0	1561.419	43	194.3	1542.936
21	192.1	1560.606	44	194.4	1542.142
22	192.2	1559.794	45	194.5	1541.349
23	192.3	1558.983	46	194.6	1540.557
24	192.4	1558.173	47	194.7	1539.766
25	192.5	1557.363	48	194.8	1538.976
26	192.6	1556.555	49	194.9	1538.186
27	192.7	1555.747	50	195.0	1537.397
28	192.8	1554.940	51	195.1	1536.609
29	192.9	1554.134	52	195.2	1535.822
30	193.0	1553.329	53	195.3	1535.036
31	193.1	1552.524	54	195.4	1534.250
32	193.2	1551.721	55	195.5	1533.465
33	193.3	1550.918	56	195.6	1532.681
34	193.4	1550.116	57	195.7	1531.898
35	193.5	1549.315	58	195.8	1531.116
36	193.6	1548.515	59	195.9	1530.334
37	193.7	1547.715	60	196.0	1529.553
38	193.8	1546.917	61	196.1	1528.773
39	193.9	1546.119			

Absolute Maximum Ratings

Table 3- Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	Ts	-40	-	85	°C	
Supply Voltage	Vcc5	-0.5	-	4.0	V	
Operating Humidity	RH	-	-	+95	%	

Recommended Operating Conditions

Table 4- Recommended operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	Top	0	-	70	°C	
Power Supply Voltage	VCC	3.14	3.3	3.46	V	
Power Supply Current	ICC	-	-	450	mA	
Data Rate	BR	9.95		11.3	Gbps	

Electrical Characteristics

Table 5- Electrical Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Transmitter						

Differential Data Input swing	Vin,p-p	mVpp	180	-	700	
Input Differential impedance	Zin	Ω	85	100	115	
Tx_Disable,P_Down/RST	VIL	V	-0.3		0.8	
	VIH	V	2.0	-	Vcc+0.3	
Receiver						
Differential Data Output	Vout,p-p	mVpp	300		850	
Output Differential impedance	Zin	Ω	80	100	120	
Output Rise Time,20%-80%	Tr	Ps	28			
Output Fall Time,20%-80%	Tf	Ps	28			
Rx_Los,Mod_NR,Interrupt	VoL	V	0		0.4	
	VoH	V	Vcc-0.5		Vcc+0.3	

Transmitter Performance:

Table 6- optical TX Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Spacing			100		Ghz	
			0.8		nm	
Average Launch Optical Power	Pout	-4	-	+4	dBm	1
Extinction Ratio	ER	8.2	-	-	dB	
Average Launch power of OFF TX	Poff	-	-	-30	dBm	
Dispersion penalty@9.95/10.7Gpbs	DP1	-	-	2	dB	
Dispersion penalty@11.1/11.3Gpbs	DP2	-	-	3	dB	
Side Mode Suppression Ratio	SMSR	35	-	-	dB	
TX Jitter	TXj	Per 802.3ae requirements				

Note: 1. The optical power is launched into 9/125 μ mSMF.

Receiver Performance:

Table 7- optical RX Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Receiver Sensitivity @9.95Gpbs/10.7Gpbs	PIN_SENS1	-	-	-16	dBm	1
Receiver Sensitivity @11.1Gpbs/11.3Gpbs	PIN_SENS2	-	-	-14	dBm	1
Overload	PIN_OL	-1.0	-		dBm	3
Optical Center Wavelength	λ C	1260	-	1600	nm	

Los Assert	LOSA	-28	-	-	dBm	
Los De-assert	LOSD	-	-	-17	dBm	
Los hysteresis	LOSH	0.5	-		dB	

Notes:1. Minimum average optical power measured at the BER less than 1E-12. The measure pattern is PRBS 2³¹-1
 3. CML logic, internally AC coupled.

Recommended Host Board Power Supply Circuit

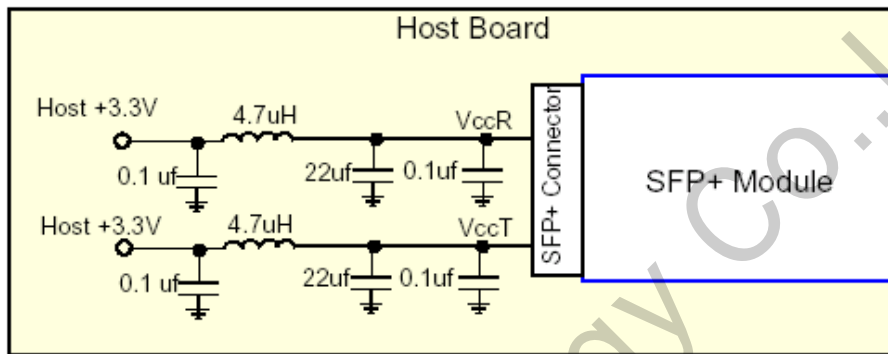
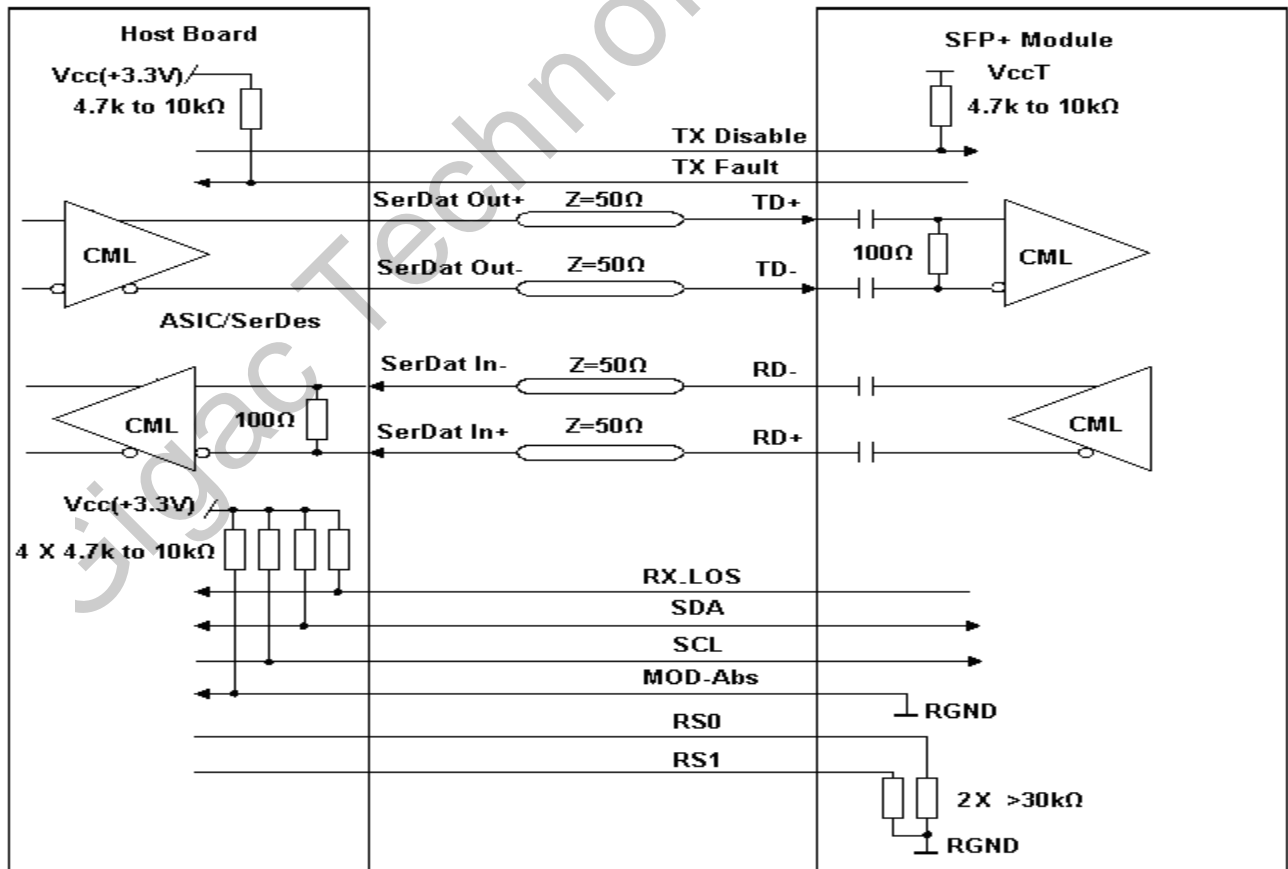


Figure 1, Recommended Host Board Power Supply Circuit

Recommended interface Circuit



Pin arrangement

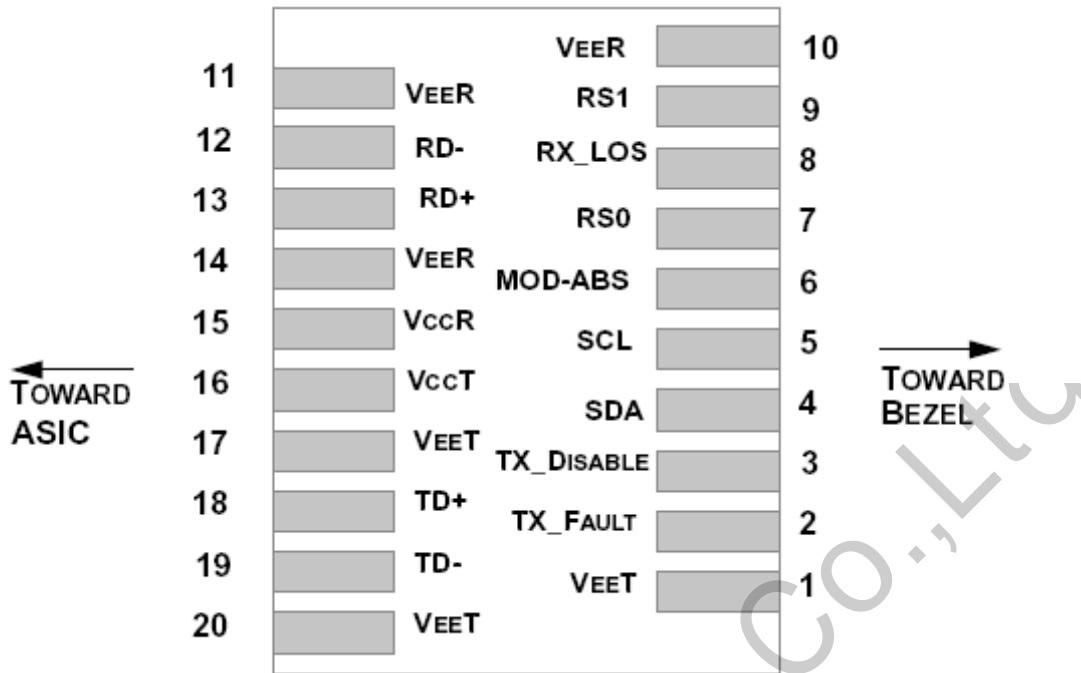


Figure 3, Pin View

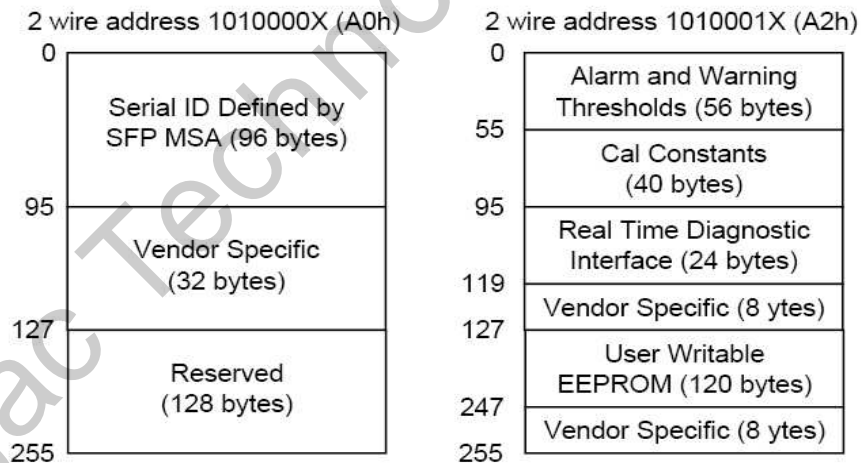
Table 8-Pin Function Definitions

Pin	Name	FUNCTION	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD_ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor..
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor.
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3 ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

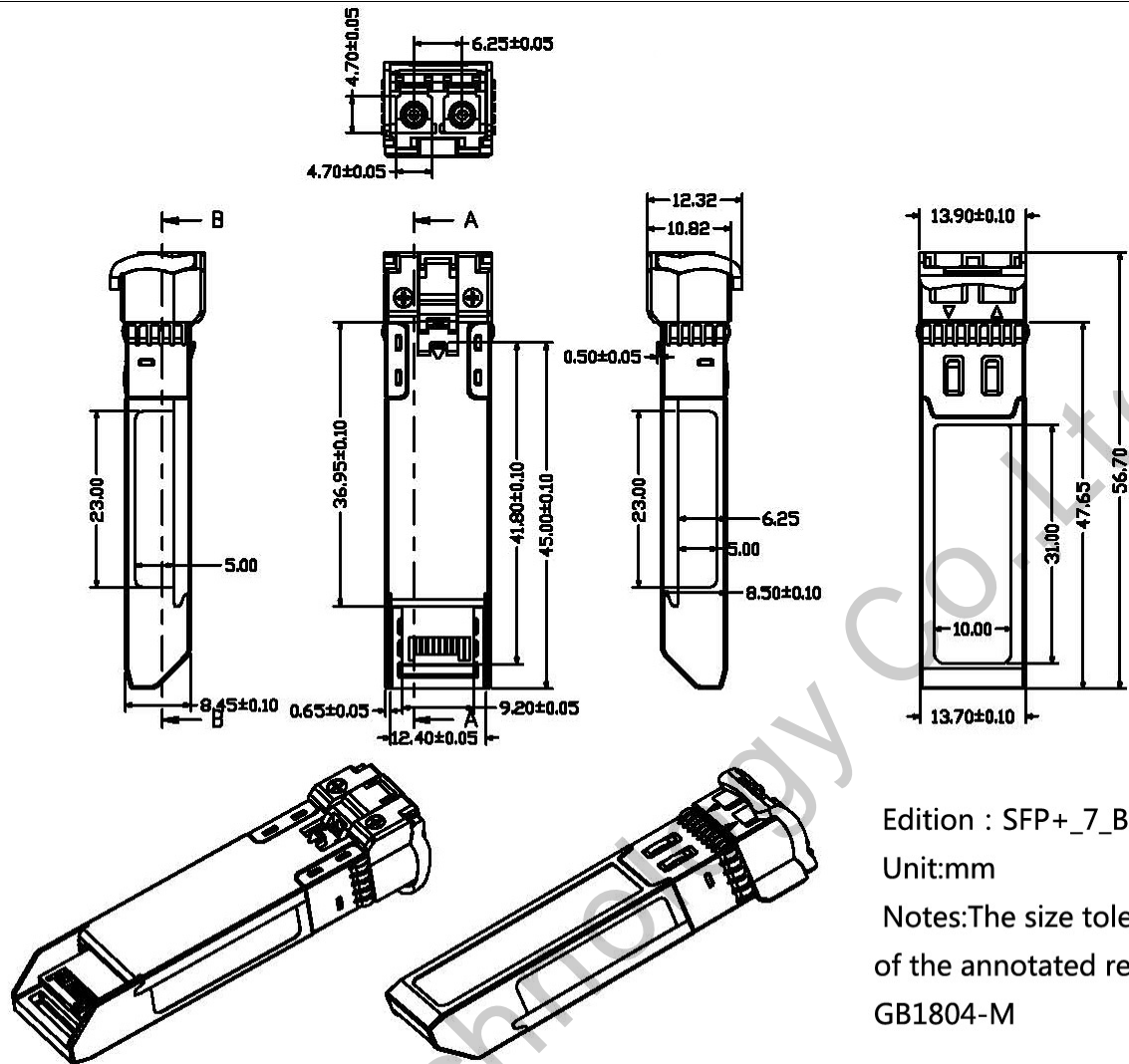
Note:

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K – 10 KΩ resistor. Its states are: Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined High (2.0 – 3.465V): Transmitter Disabled Open: Transmitter Disabled
3. Module Absent, connected to VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and $V_{ccT}/R+0.3V$. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
5. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
6. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700 mV differential (175 –350 mV single ended) when properly terminated.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 725mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP+ transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.
8. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 150 – 1200 mV (75 – 600mV single-ended).

Digital Diagnostic Memory Map



Mechanical Dimension:



Edition : SFP+_7_B

Unit:mm

Notes:The size tolerance of the annotated reference GB1804-M

Figure 5, Mechanical Diagram (Rev SFP+_7_b)

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007	CDRH compliant and Class I laser product. TÜV Certificate No. 50135086

	EN (IEC) 60825-2:2004+A1	
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards ^{*note2}

Note1: For update of the equipment and strict control of raw materials, Gigac has the ability to supply the customized products since Jan 1, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Gigac's transceivers, because Gigac's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Notice

Gigac reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. Gigac makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Revision history

Version	Initiated	Reviewed	Revision History	Release Date
A0	Simon	Smith	Initialization	2012-04-08
A1	Code	Smith	Updated output power value.	2013-03-28
A2	Code	lucky	Update case temp. symbol.	2014-06-24
A3	code	Lucky	Add the extended temperature range	2015-03-18

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