



ORIENT

Photo coupler

Product Data Sheet

Part Number: ORPC-816

Customer: _____

Date: _____

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1. Features

- (1) Current transfer ratio (CTR : MIN. 50% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$)
- (2) High input-output isolation voltage ($V_{iso} = 5,000\text{Vrms}$)
- (3) Response time (t_r : TYP. $4\mu\text{s}$ at $V_{CE} = 2\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$)
- (4) ESD pass HBM 8000V/MM 2000V
- (5) Safety approval
 - UL approved (No.E323844)
 - VDE approved (No.40029733)
 - CQC approved (No.CQC09001029446)
- (6) In compliance with RoHS, REACH standards
- (7) MSL ClassI



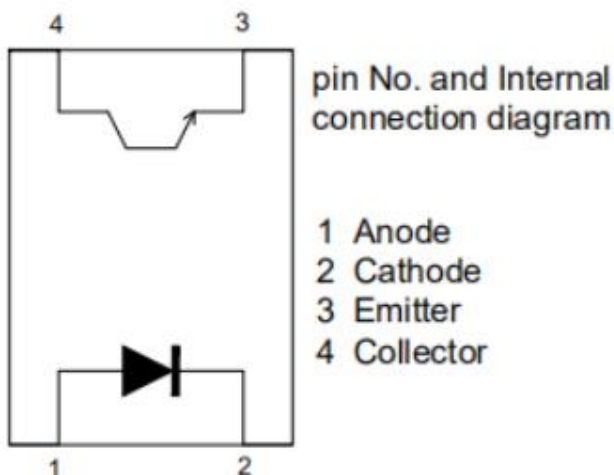
2. Description

- (1) ORPC-816 photo coupler consist of one piece of GaAs emitter and one piece of NPN transistor.
- (2) They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

3. Applications

- (1) Switching power supply
- (2) Ammeter
- (3) Computer
- (4) Instrumental application, measurement machine
- (5) Imbursement equipments, duplicating machine, automat
- (6) Family-use electric equipments, such as fans
- (7) Signal transforming systems

4. Functional Diagram



5. Absolute Maximum Ratings at Ta=25°C

Parameter		Symbol	Rated Value	Unit
Input	Forward Current	I_F	60	mA
	Peak forward Current (100µs pulse, 100Hz frequency)	I_{FP}	1	A
	Reverse Voltage	V_R	6	V
	Consume Power	P	70	mW
Output	Collector and emitter Voltage	V_{CEO}	80	V
	Emitter and collector Voltage	V_{ECO}	7	
	Collector Current	I_C	50	mA
	Consume Power	P_C	150	mW
Total Consume Power		P_{tot}	200	mW
*1 Insulation Voltage		V_{iso}	5,000	Vrms
Max Insulation Voltage (Insulating oil test)		V_{IOTM}	10,000	V
Rated Impulse Insulation Voltage		V_{IORM}	630	V
Working Temperature		T_{opr}	-55 to + 110	°C
Deposit Temperature		T_{stg}	-55 to + 125	
*2 Soldering Temperature		T_{sol}	260	

*1.AC For 1 Minute, R.H. = 40 ~ 60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

*2. Soldering time is 10 seconds

6. Electro-Optical Characteristics (Ta=25°C unless specified otherwise)

Parameter		Symbol	Min	Typ. *	Max	Unit	Condition
Input	Forward Voltage	V _F	---	1.2	1.4	V	I _F =20mA
	Reverse Current	I _R	---	---	5	μA	V _R =5V
	Collector capacitance	C _t	---	30	250	pF	V=0, f=1KHz
Output	Collector to emitter Current	I _{CEO}	---	---	100	nA	V _{CE} =20V, I _F =0mA
	Collector and Emitter attenuation Voltage	BV _{CEO}	80	---	---	V	I _C =0.1mA I _F =0mA
	Emitter and Collector attenuation Voltage	BV _{ECO}	7	---	---	V	I _E =0.1mA I _F =0mA
Transforming Characteristics	*1 Current conversion ratio	CTR	50	---	600	%	I _F =5mA V _{CE} =5V
	Collector Current	I _C	2.5	---	30	mA	
	Collector and Emitter Saturation Voltage	V _{CE(sat)}	---	0.1	0.2	V	I _F =20mA I _C = 1mA
	Insulation Impedance	R _{iso}	5×10 ¹⁰	1×10 ¹²	---	Ω	DC500V 40~60%R.H.
	Floating Capacitance	C _f	---	0.6	1.0	pF	V=0, f=1MHz
	Cut-off Frequency	f _c	---	80	---	kHz	V _{CE} =5V, I _C =2mA R _L =100Ω,-3dB
	Rise Time	t _r	---	4	18	μs	V _{CE} =2V, I _C =2mA R _L =100Ω
	Descend Time	t _f	---	3	18	μs	

*1 Current Conversion Ratio = $I_C / I_F \times 100\%$, CTR Tolerance:±3%.



7. Rank Table of Current Transfer Ratio

(1) ORPC-816

Grade Sign	Min (%)	Max (%)
ORPC-816L	50	100
ORPC-816A	80	160
ORPC-816B	130	260
ORPC-816C	200	400
ORPC-816D	300	600

Note: Working condition: $I_F=5\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$.

(2) ORPC-816M

Grade Sign	Min (%)	Max (%)
ORPC-816ML	50	100
ORPC-816MA	80	160
ORPC-816MB	130	260
ORPC-816MC	200	400
ORPC-816MD	300	600

Note: Working condition: $I_F=5\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$.

(3) ORPC-816S

Grade Sign	Min (%)	Max (%)
ORPC-816SL	50	100
ORPC-816SA	80	160
ORPC-816SB	130	260
ORPC-816SC	200	400
ORPC-816SD	300	600

Note: Working condition: $I_F=5\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$.



8. Order Information

Part Number

ORPC-816XT-V-W-Y-Z

Note

X = Lead form option (S, M or none)

T = CTR Rank (L, A, B, C, D or none)

V = Tape and reel option (TP, TP1 or none).

W = Lead frame option (F: Iron, C:copper)

Y = 'V' code for VDE safety (This options is not necessary).

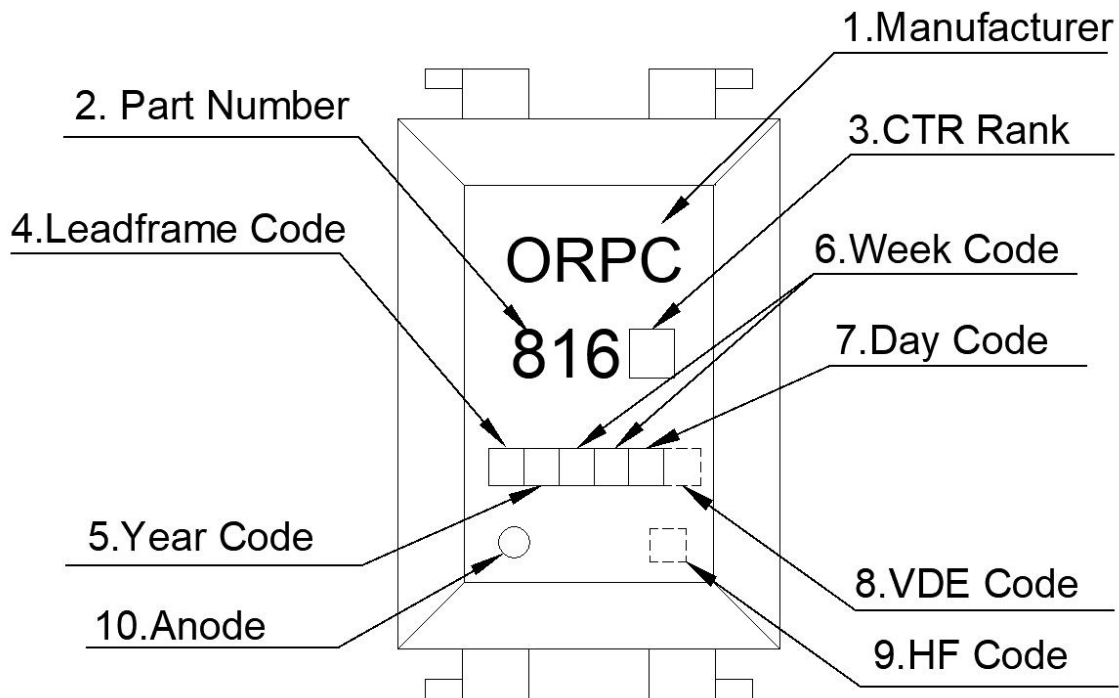
Z = 'G' code for Halogen free (This options is not necessary).

* VDE Code can be selected.

* Halogen Free can be selected.

Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S(TP)	Surface mount lead form (low profile) + TP tape & reel option	2000 units per reel
S(TP1)	Surface mount lead form (low profile) + TP1 tape & reel option	2000 units per reel

9. Naming Rule

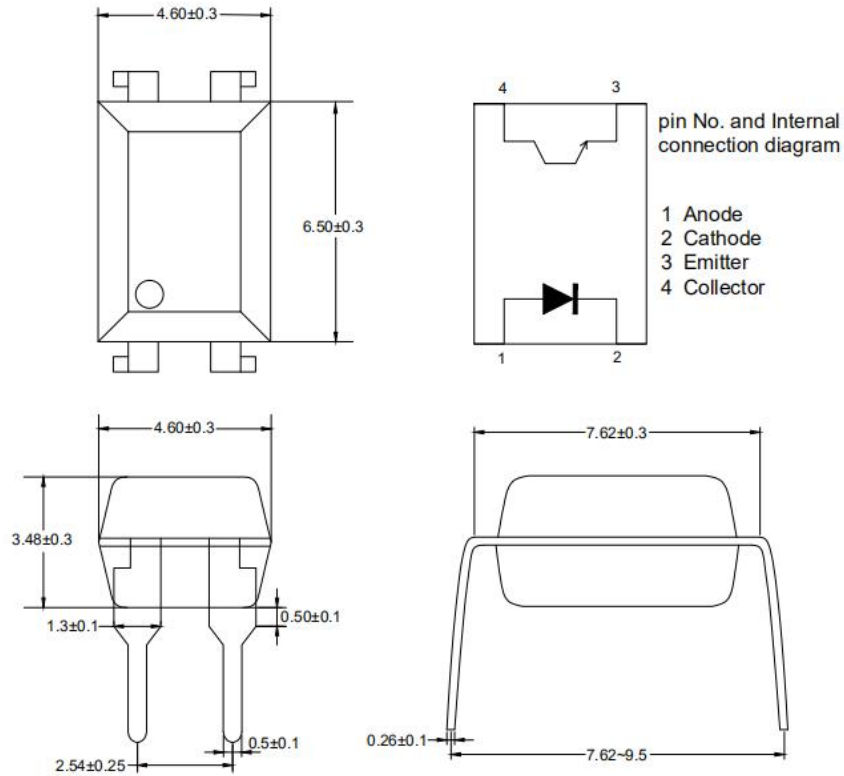


- (1) Manufacturer : ORIENT.
- (2) 816 denotes Part Number.
- (3) CTR Rank : CTR rank code.
- (4) Lead frame Code : 'F' means Iron, 'C' means Copper.
- (5) Year Code : '1' means '2021' and so on.
- (6) Week Code : 01 means the first week, 02 means the second week and so on.
- (7) Day Code : "A to G" means "Monday to Sunday"
- (8) VDE Code . (Optional)
- (9) HF Code : Halogen Free. . (Optional)
- (10) Anode.

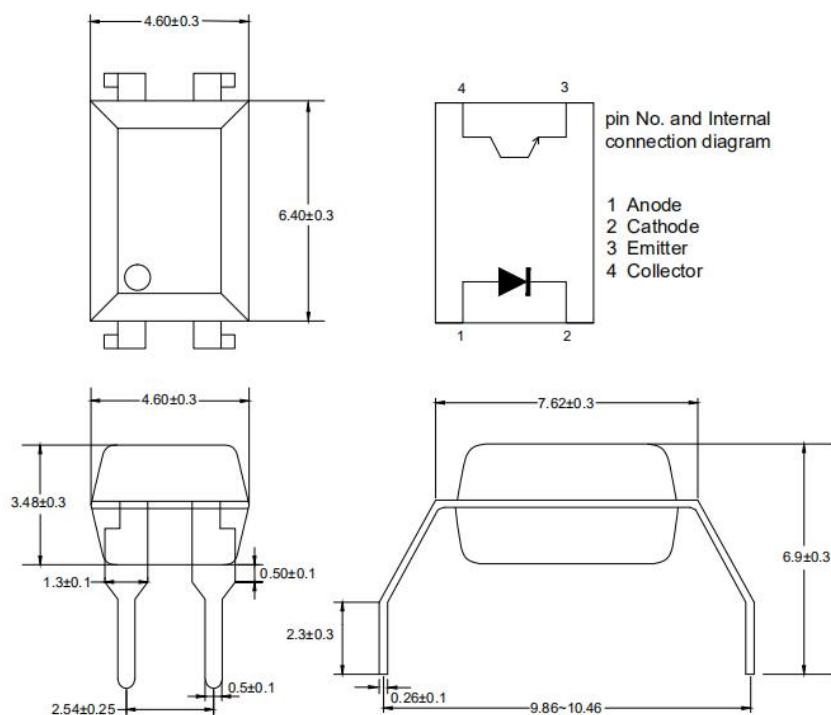
* Halogen Free Mark can be selected.
 * VDE Mark can be selected.

10. Package Dimension (Unit: mm)

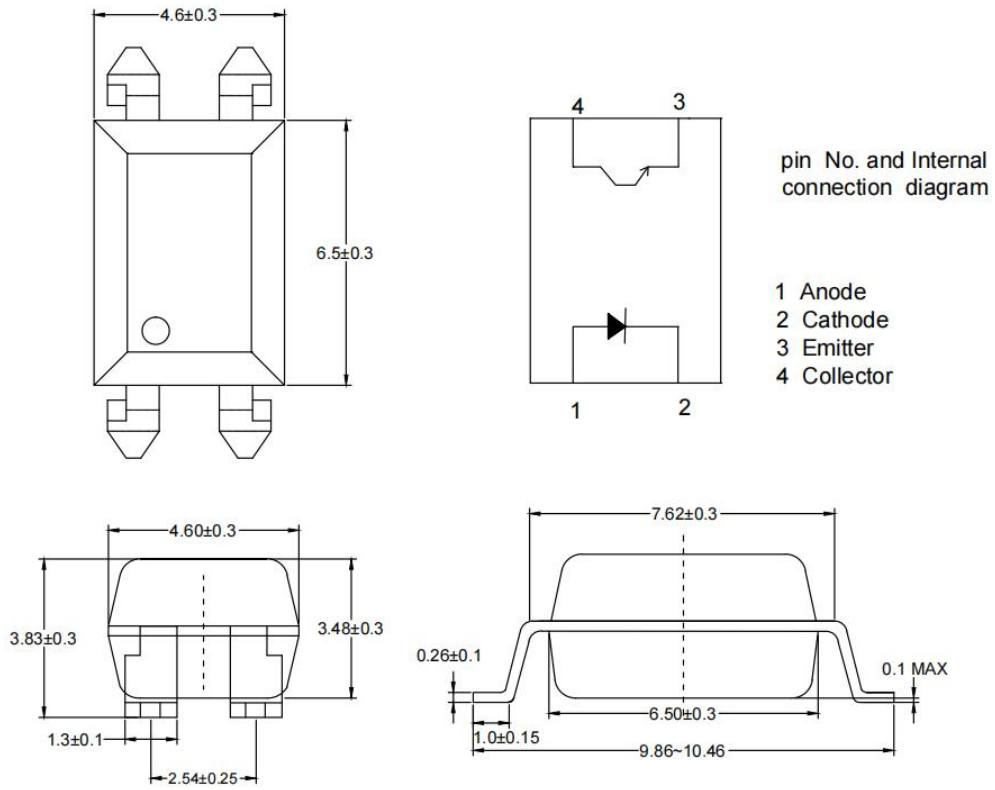
(1) ORPC-816



(2) ORPC-816M

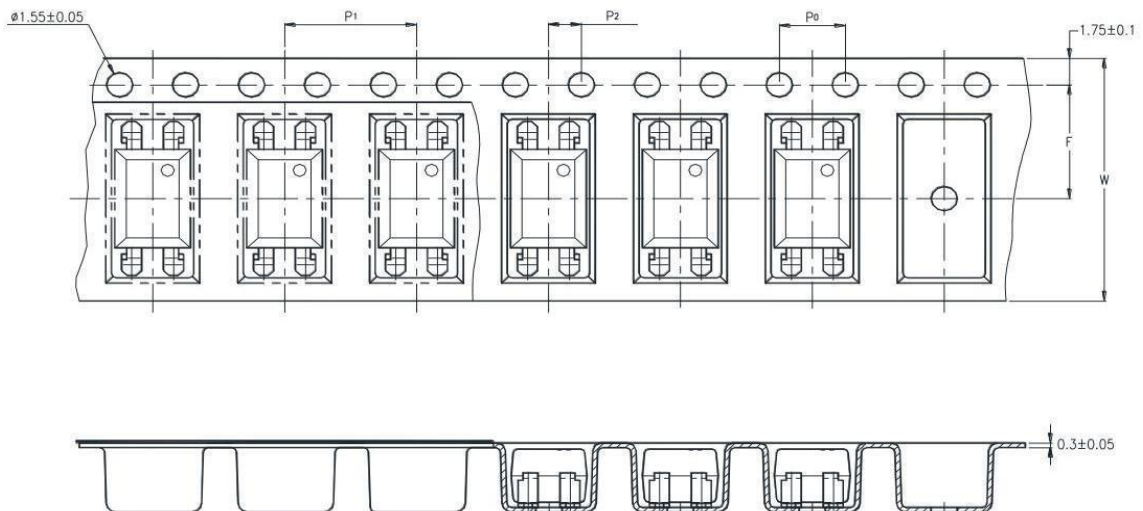


(3) ORPC-816S

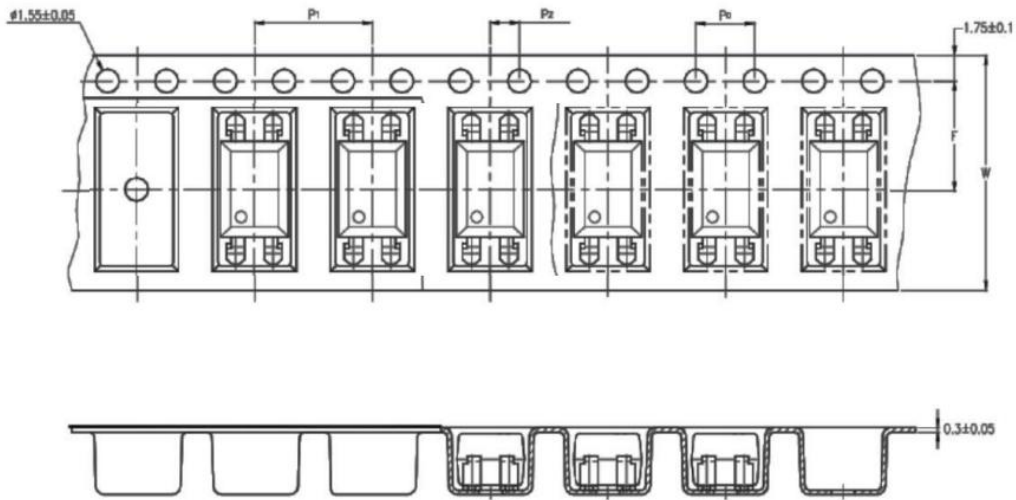


11. Taping Dimensions

(1)ORPC-816S-TP



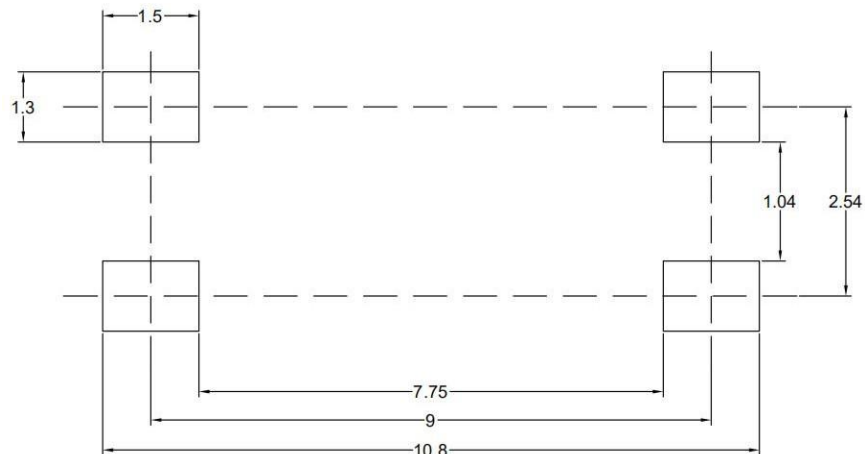
(2)ORPC-816S-TP1



Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (.63)
Pitch of sprocket holes	P ₀	4±0.1 (.15)
Distance of compartment	F	7.5±0.1 (.295)
	P ₂	2±0.1 (.0079)
Distance of compartment to compartment	P ₁	8±0.1 (.472)

Package Type	TP/TP1
Quantities(pcs)	2000

12. Recommended Foot Print Patterns (Mount Pad) (Unit: mm)



13. Package Dimension

(1) package dimension





DIP Type






Packing Information	
Packing type	Tube
Qty per Tube	100pcs
Small box (Inner) Dimension	525*128*60mm
Large box (Outer) Dimension	545*290*335mm
The Amount per Inner Box	5,000pcs
The Amount per Outer Box	50,000pcs

SOP Type

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	2,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	4,000pcs
Max qty per large box	40,000pcs

(2)Packing Label Sample

Material Code : 120PCXXXXXX

P/N: OR-XXXXXX

Lot No. : XXXXXX-XXXX-TX-X

D/C: XXXX

Qty: XXXX PCS


内箱码

外箱码

“XXXXXXXXXXXXXXXX” (一体机序列码)
Made in China

Note:

1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

14. Reliability Test

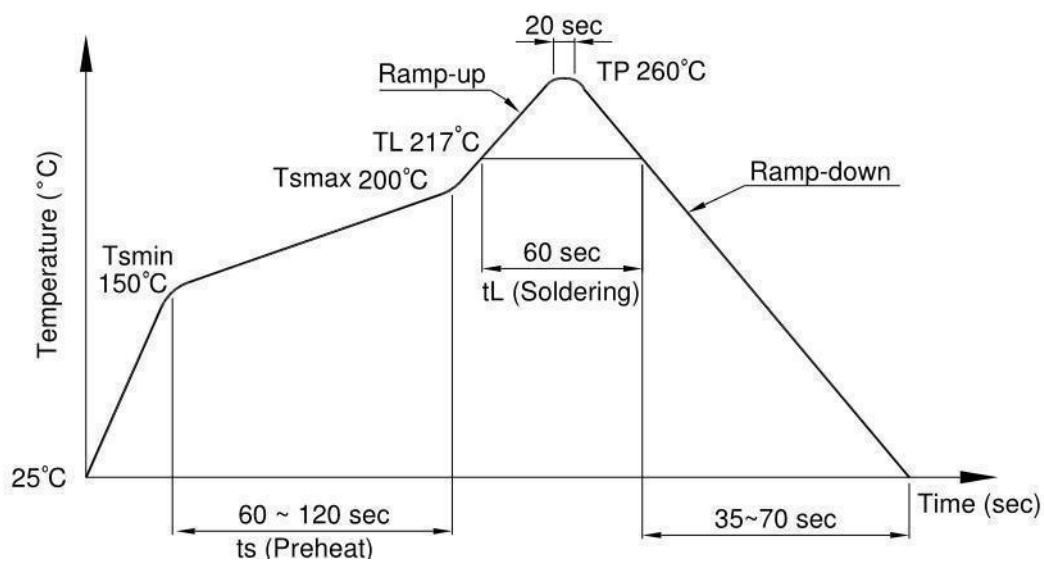
NO.	ITEMS	Reliability Testing				
		QTY. (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	10s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs	高温烤箱 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
3	LTSL 低温存储	77	-55℃	168 hrs	低温箱 测试仪	JESD22-A119
				500 hrs		
				1000 hrs		
4	TC 温度循环	77	H:125℃ 15min ∫ 5min L:-55℃ 15min	300 cycle	冷热冲击机	JESD22-A104
5	TS 温度冲击	77	H:100℃ 5min ∫ 15s L:-40℃ 5min	300 cycle	冷热冲击机	JESD22-A106
6	HTOL 高温操作	77	110℃ IF=10mA Vce=5V	168 hrs	高温烤箱 测试仪、老 化电路板	JESD22-A108
				500 hrs		
				1000 hrs		
7	ESD-HBM 人体模式	22	≥8KV 1Cycle	1次	ESD静电测 试仪	JESD22-A114
8	SD 可焊性	22	Pb-free 245±5℃	5S/1次	锡炉	JESD22-B102
9	HTRB 高温反向偏压	77	HTRB @125℃ Vce=80v	168 hrs	高温烤箱 , 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
10	H3TRB 温湿度反向偏 压, 寿命试验	77	H3TRB 85℃,85%RH Vce=80v	168 hrs	恒温恒湿 机, 测试仪	JESD22-A101
				500 hrs		
				1000 hrs		
11	Autoclave 压力锅	77	Ta=121 ℃,100%RH,2atm	96hrs	压力锅	JESD22-A102

15. Temperature Profile Of Soldering

(1).IR Reflow soldering (JEDEC-STD-020C compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

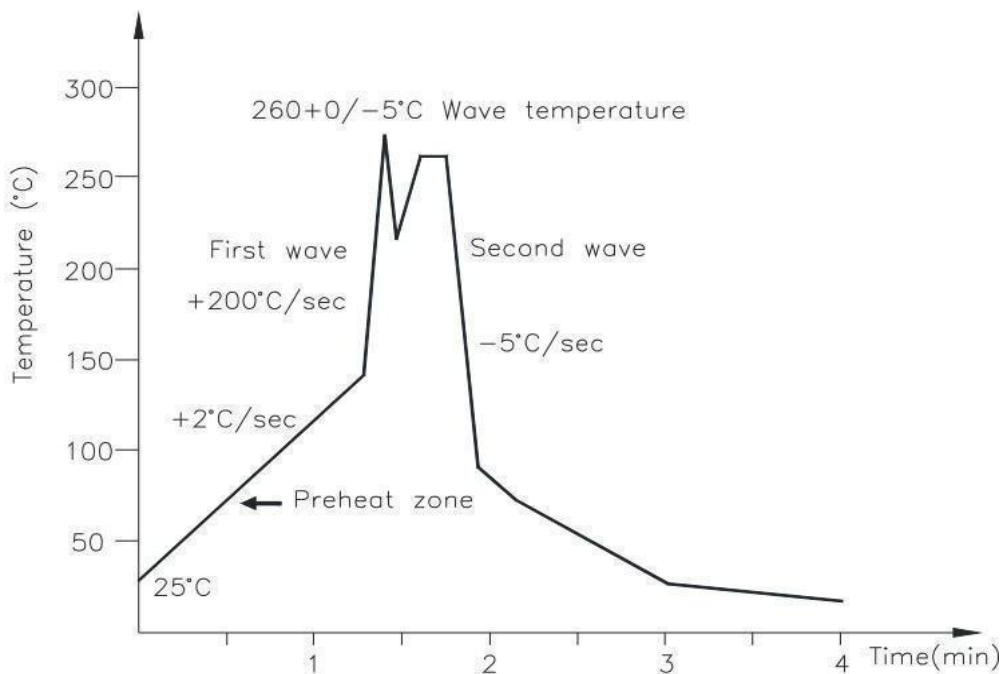
Profile item	Conditions
Preheat	
- Temperature Min (T Smin)	150°C
- Temperature Max (T Smax)	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL)	217°C
- Time (t L)	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature	3~6°C / sec
Reflow times	≤3



(2).Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature	260+0/-5°C
Time	10 sec
Preheat temperature	25 to 140°C
Preheat time	30 to 80 sec



(3).Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature	380+0/-5°C
Time	3 sec max

16. Characteristics Curves

Fig.1 Forward current vs Ambient temperature

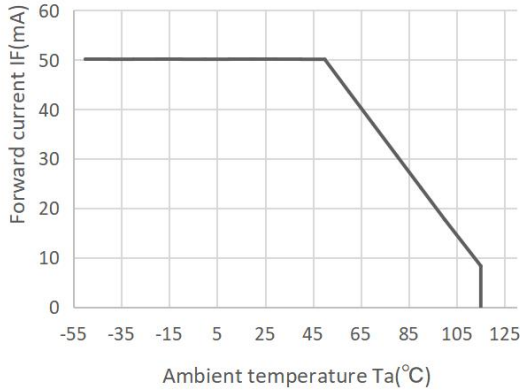


Fig.2 Collector Power Dissipation vs. Ambient temperature

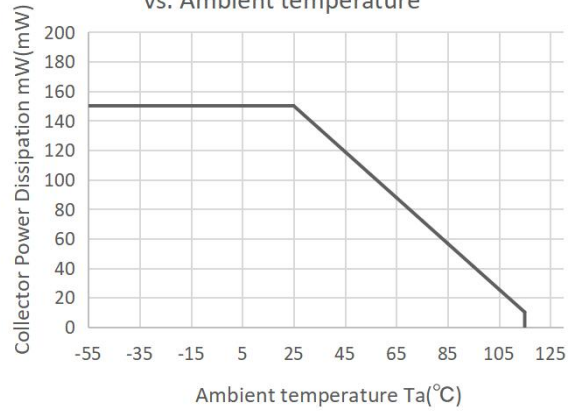


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

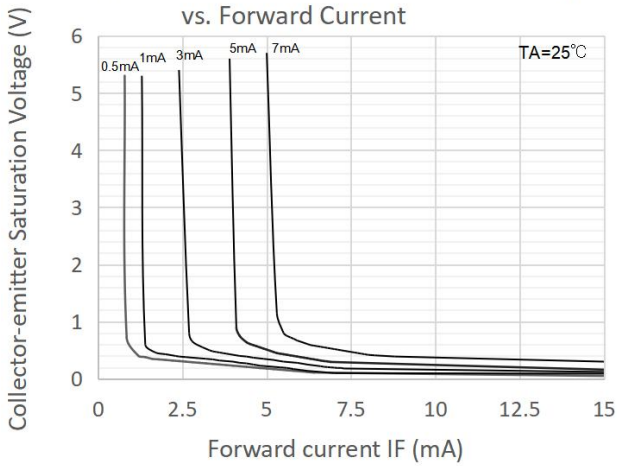


Fig.4 Forward Current vs. Forward Voltage

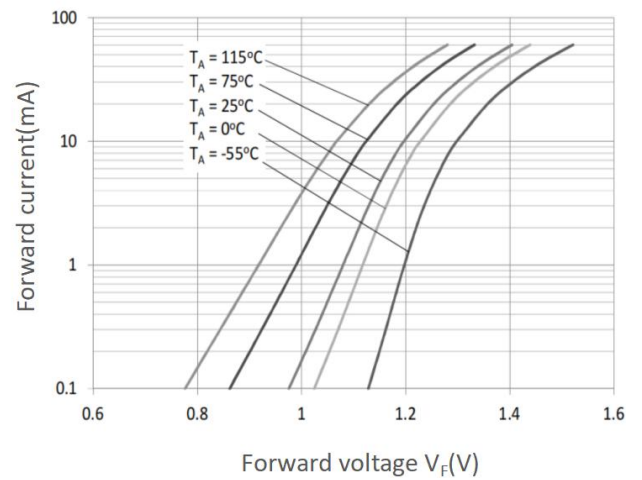


Fig.5 Forward Current vs. Current Transfer Ratio

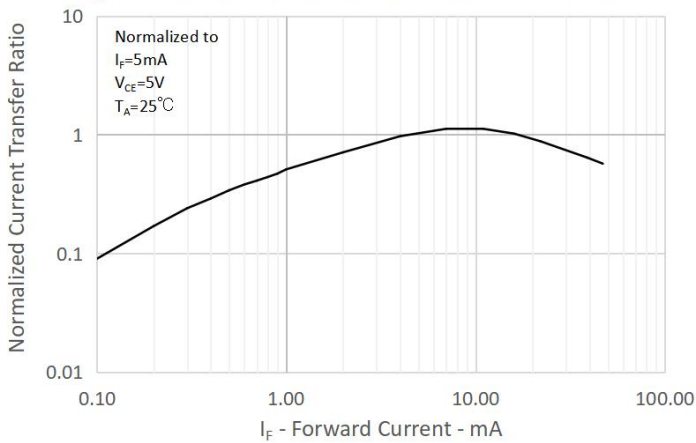


Fig.6 Collector Current vs. Collector-emitter Voltage

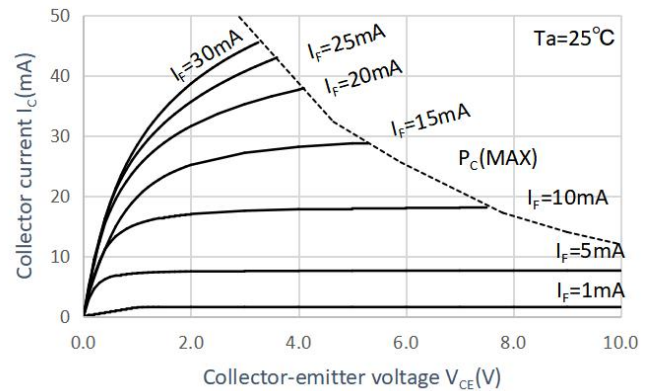


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

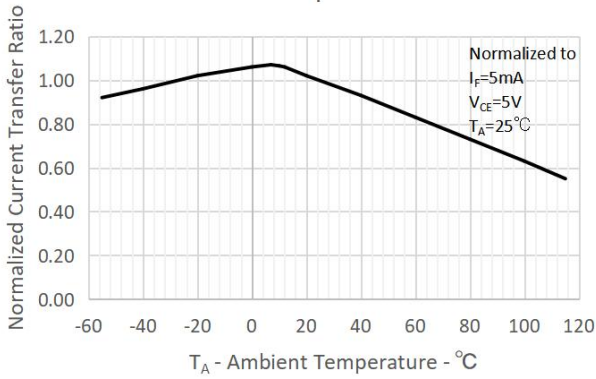


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

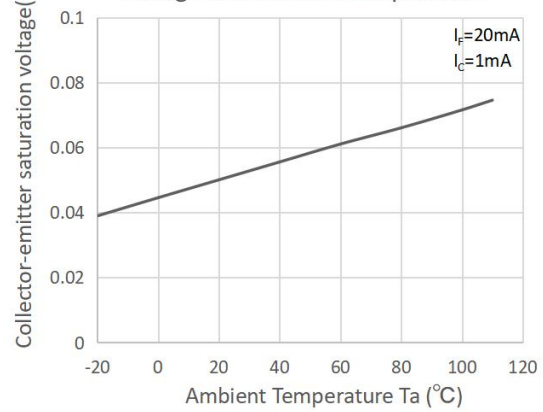


Fig.9 Collector Dark Current vs. Ambient Temperature

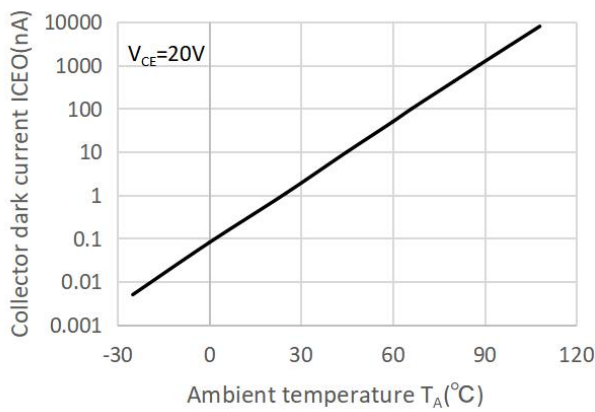


Fig.10 Respinse Time vs. Load Resistance

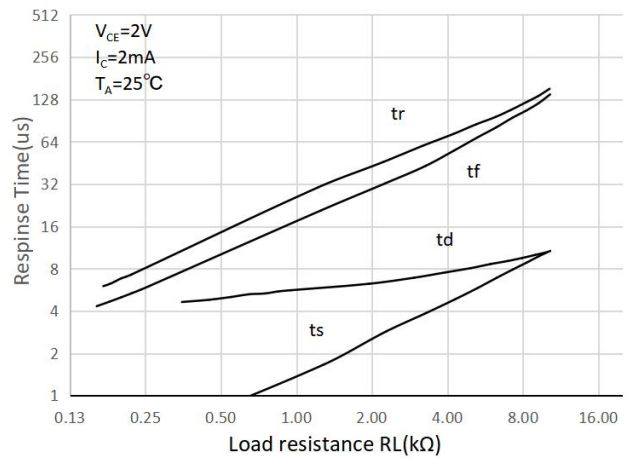
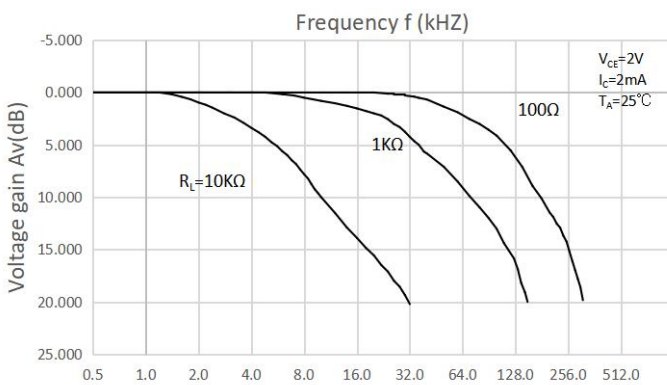
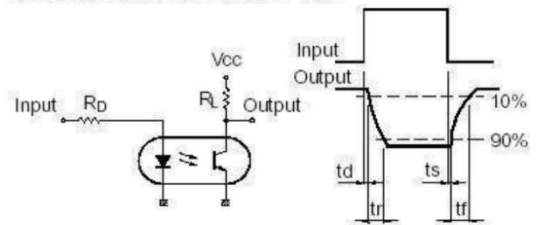


Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response

