

ISP816 Series

DESCRIPTION

The ISP816 series of optically coupled isolator consist of an infrared light emitting diode and an NPN silicon photo transistor in a space efficient Dual In Line Plastic Package.

FEATURES

- AC Isolation Voltage 5000V_{RMS}
- CTR Selections Available
- Wide Operating Temperature Range -55°C to +110°C
- RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

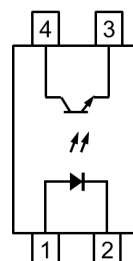
APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedances

ORDER INFORMATION

- Add X after PN for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel

ISP816



- | | |
|---|-----------|
| 1 | Anode |
| 2 | Cathode |
| 3 | Emitter |
| 4 | Collector |



ABSOLUTE MAXIMUM RATINGS (T_A = 25° C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device.

Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Input

Forward Current	50mA
Peak Forward Current (100μs, 100Hz)	1A
Reverse Voltage	6V
Power dissipation	70mW
Junction Temperature	125 °C

Output

Collector to Emitter Voltage V _{CEO}	80V
Emitter to Collector Voltage V _{ECO}	6V
Collector Current	50mA
Power Dissipation	150mW
Junction Temperature	125 °C

Total Package

Isolation Voltage	5000V _{RMS}
Total Power Dissipation	200mW
Operating Temperature	-55 to 110 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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ISP816 Series

ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	$I_F = 20\text{mA}$		1.2	1.4	V
Reverse Leakage	I_R	$V_R = 4\text{V}$			10	μA
Terminal Capacitance	C_t	$V = 0\text{V}, f = 1\text{KHz}$		30	250	pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector–Emitter Breakdown Voltage	BV_{CEO}	$I_C = 0.1\text{mA}, I_F = 0\text{mA}$	80			V
Emitter–Collector Breakdown Voltage	BV_{ECO}	$I_E = 10\mu\text{A}, I_F = 0\text{mA}$	6			V
Collector–Emitter Dark Current	I_{CEO}	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$			100	nA

ISP816 Series

ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	$I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$	50		600	%
		Optional CTR Grades				
		GB	100		600	
		BL	200		600	
		GR	100		300	
		A	80		160	
		B	130		260	
		C	200		400	
		D	300		600	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_F = 20\text{mA}$, $I_C = 1\text{mA}$		0.1	0.2	V
Floating Capacitance	C_f	$V = 0\text{V}$, $f = 1\text{MHz}$		0.6	1	pF
Cut-Off Frequency	f_C	$V_{CE} = 5\text{V}$, $I_C = 2\text{mA}$ $R_L = 100\Omega$ -3dB		80		kHz
Output Rise Time	t_r	$V_{CC} = 5\text{V}$ $I_C = 2\text{mA}$ $R_L = 100\Omega$		4	18	μs
Output Fall Time	t_f			3	18	

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Input to Output Isolation Voltage	V_{ISO}	AC 1 minute, RH = 40% to 60%	5000			V_{RMS}
Input to Output Isolation Resistance	R_{ISO}	$V_{IO} = 500\text{VDC}$ RH = 40% to 60%	5×10^{10}	1×10^{11}		Ω

Measure with input leads shorted together and output leads shorted together.



ISP816 Series

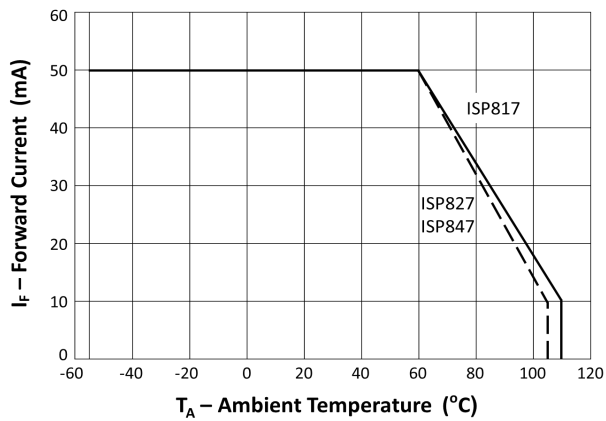


Fig 1 Forward Current vs Ambient Temperature

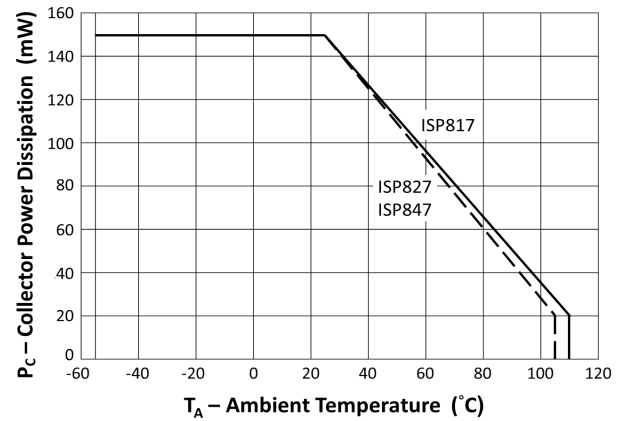


Fig 2 Collector Power Dissipation vs Ambient Temperature

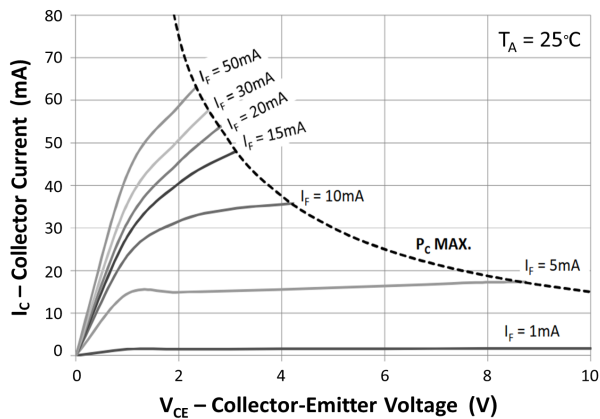


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

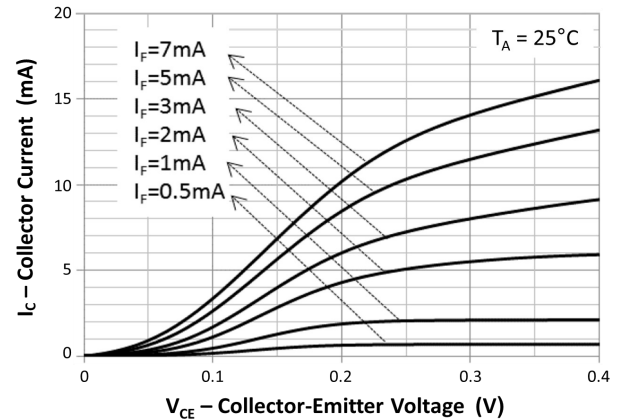


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

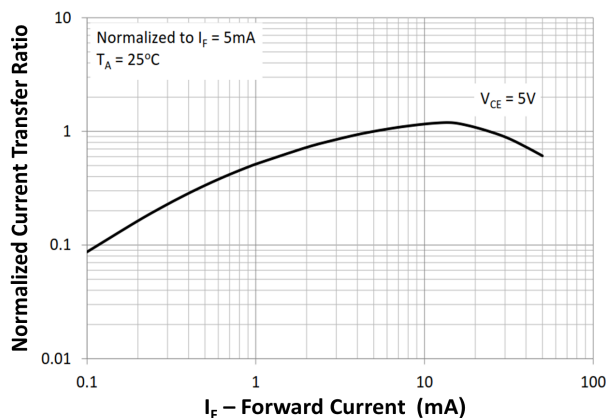


Fig 5 Normalized Current Transfer Ratio vs Forward Current

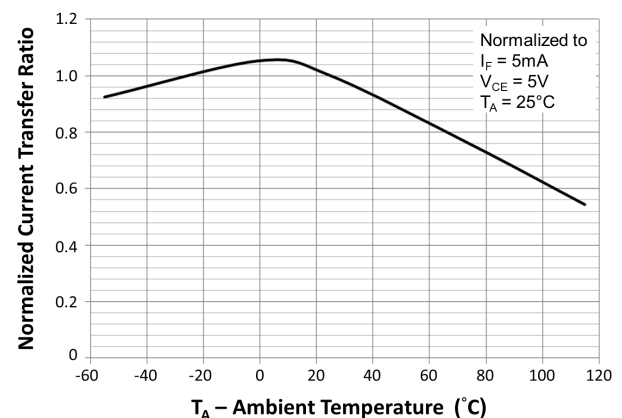


Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature



ISP816 Series

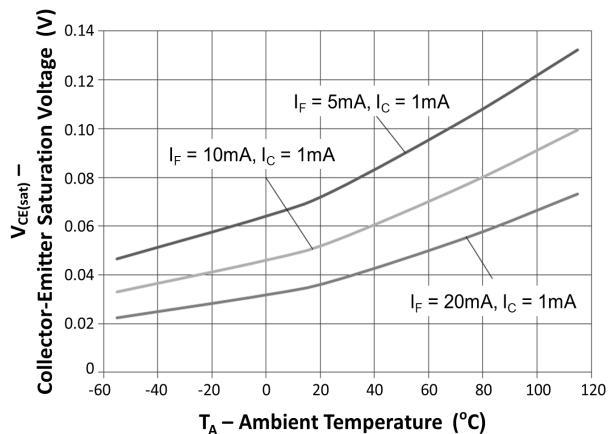


Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature

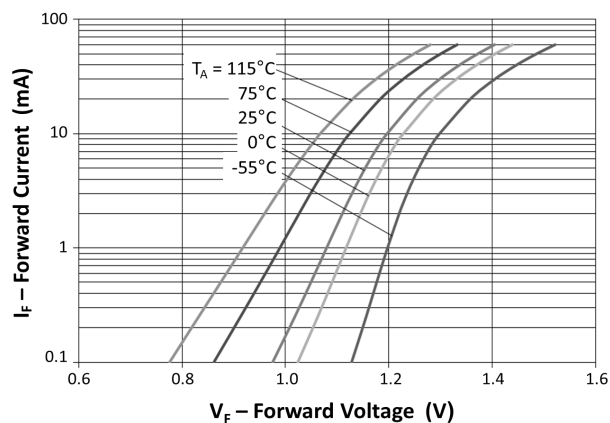


Fig 8 Forward Current vs Forward Voltage

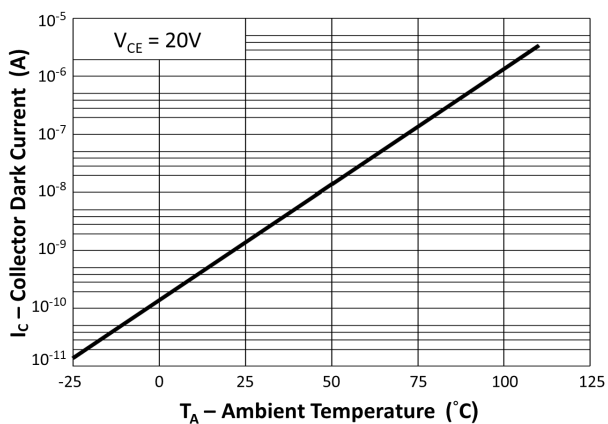


Fig 9 Collector Dark Current vs Ambient Temperature

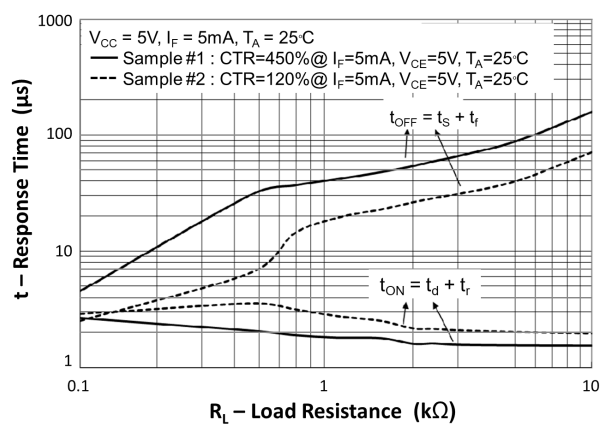


Fig 10 Switching Time vs Load Resistance

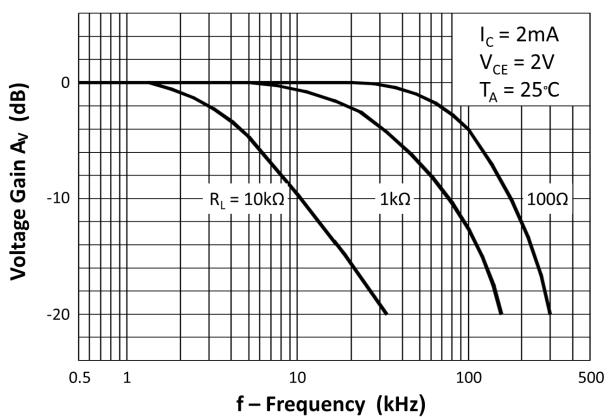
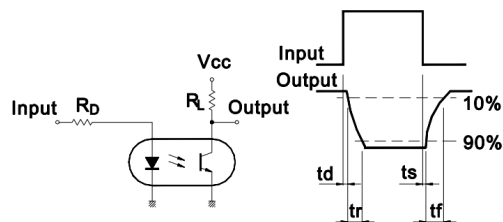
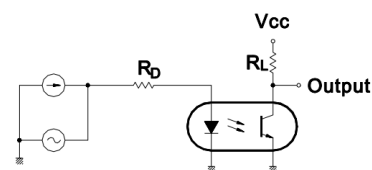


Fig 11 Frequency Response



Response Time Test Circuit



Frequency Response Test Circuit

ISP816 Series

ORDER INFORMATION

ISP816 (UL Approval)			
After PN	PN	Description	Packing quantity
None	ISP816, ISP816GB, ISP816BL ISP816GR, ISP816A, ISP816B ISP816C, ISP816D	Standard DIP4	100 pcs per tube
G	ISP816G, ISP816GBG, ISP816BLG ISP816GRG, ISP816AG, ISP816BG ISP816CG, ISP816DG	10mm Lead Spacing	100 pcs per tube
SM	ISP816SM, ISP816GBSM, ISP816BLSM ISP816GRSM, ISP816ASM, ISP816BSM ISP816CSM, ISP816DSM	Surface Mount	100 pcs per tube
SMT&R	ISP816SMT&R, ISP816GBSMT&R ISP816GRSMT&R, ISP816BLSMT&R ISP816ASMT&R, ISP816BSMT&R ISP816CSMT&R, ISP816DSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

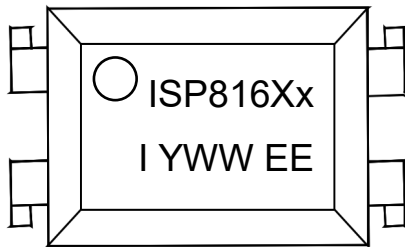
ORDER INFORMATION

Note: grade-xX-VDE = VDE-Xx-grade (e.g. AX = XA, BX = XB,etc)

ISP816X (UL and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	ISP816X, ISP816XGB, ISP816XBL, ISP816XGR, ISP816XA, ISP816XB, ISP816XC, ISP816XD	Standard DIP4	100 pcs per tube
G	ISP816XG, ISP816XGBG, ISP816XB LG, ISP816XGRG, ISP816XAG, ISP816XBG, ISP816XCG, ISP816XDG	10mm Lead Spacing	100 pcs per tube
SM	ISP816XSM, ISP816XGBSM, ISP816XGRSM, ISP816XBLSM, ISP816XASM, ISP816XB SM, ISP816XCSM, ISP816XDSM	Surface Mount	100 pcs per tube
SMT&R	ISP816XSMT&R, ISP816XGBSMT&R, ISP816XGRSMT&R, ISP816XBLSMT&R, ISP816XASMT&R, ISP816XBSMT&R, ISP816XCSMT&R, ISP816XDSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISP816 Series

DEVICE MARKING



ISP816 Part Number for Single Channel

X VDE Option

x CTR Grade, e.g. A, B, C, etc.

Note : Alternate Marking xX (e.g. AX, BX, etc.)

I Isocom

Y Year code (can be single or double digit)

WW 2 digit Week code

EE UL Model



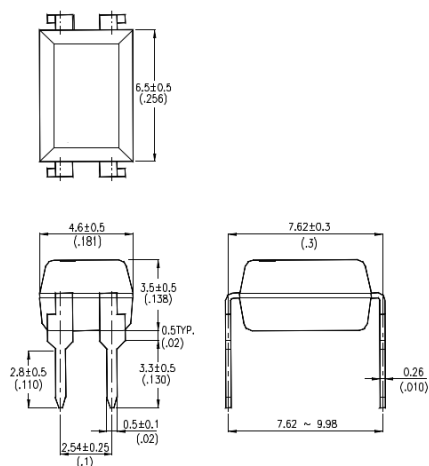
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COMPONENTS

ISP816 Series

PACKAGE DIMENSIONS in mm (inch)

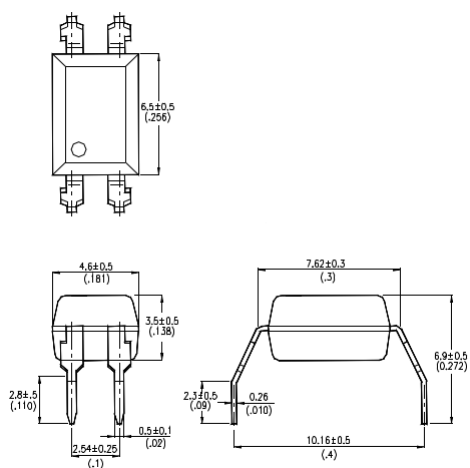
DIP

ISP816



G Form

ISP816G





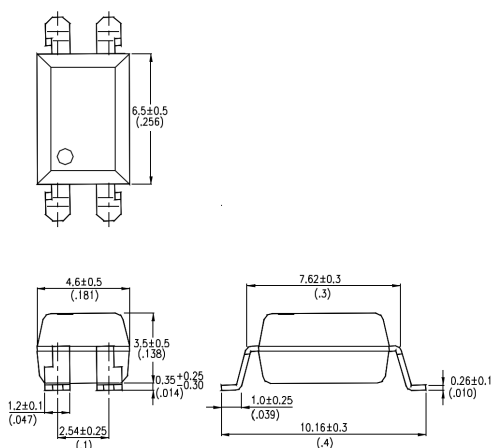
ISOCOM
COMPONENTS

ISP816 Series

PACKAGE DIMENSIONS in mm (inch)

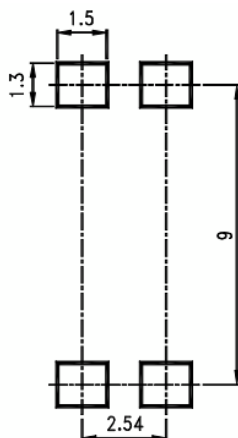
SMD

ISP816SM



Recommended Pad Layout for SMD (mm)

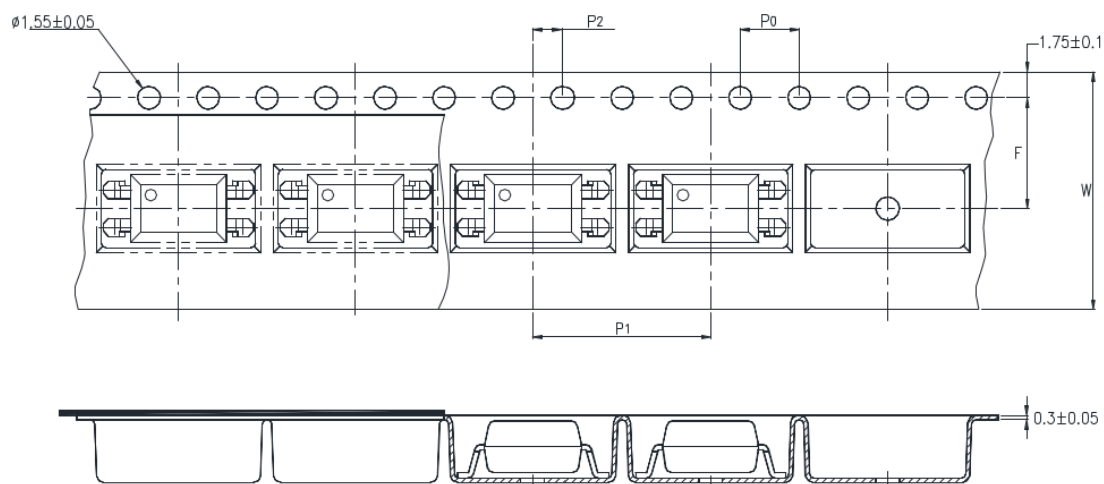
ISP816SM



ISP816 Series

TAPE AND REEL PACKAGING

ISP816SMT&R



Description	Symbol	Dimension mm (inch)
Tape Width	W	16 ± 0.3 (0.63)
Pitch of Sprocket Holes	P ₀	4 ± 0.1 (0.15)
Distance of Compartment to Sprocket Holes	F	7.5 ± 0.1 (0.295)
	P ₂	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P ₁	12 ± 0.1 (0.472)

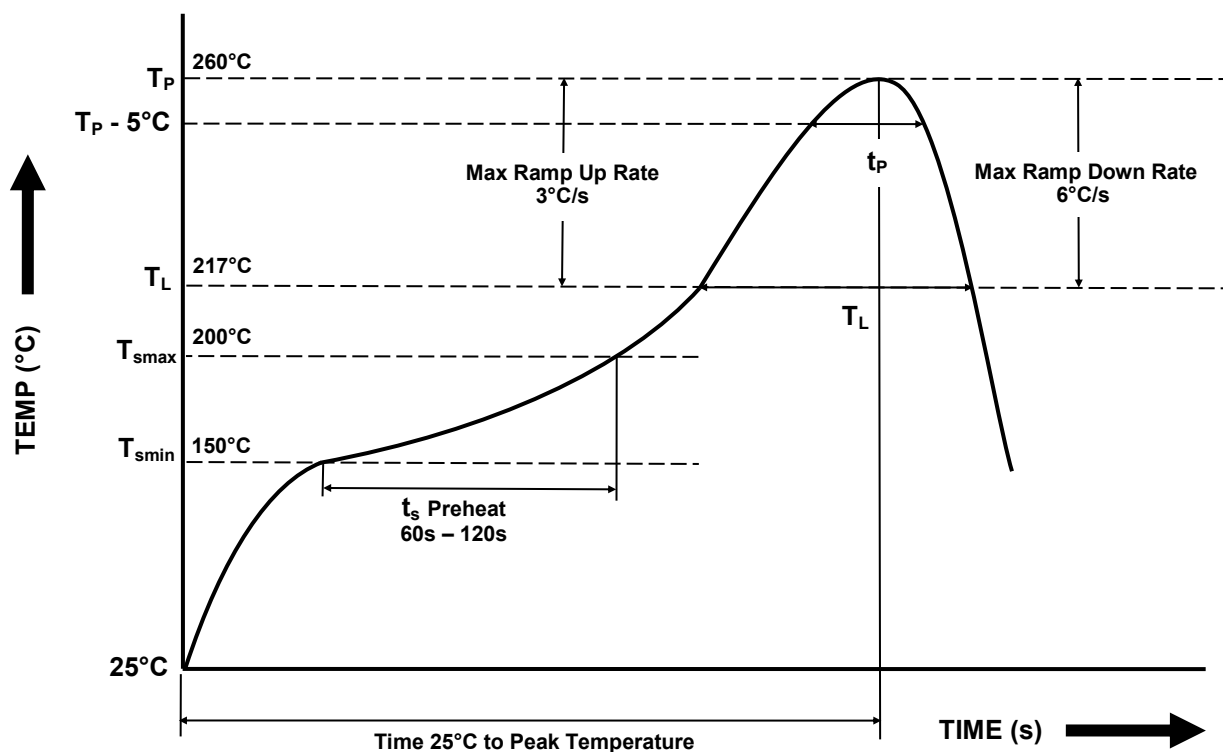


ISP816 Series

IR REFLOW SOLDERING TEMPERATURE PROFILE FOR SMD

One Time Reflow Soldering is Recommended.

Do Not Immerse Device Body in Solder Paste.



Profile Details	Conditions
Preheat - Min Temperature (T_{SMIN}) - Max Temperature (T_{SMAX}) - Time T_{SMIN} to T_{SMAX} (t_s)	150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Time at Peak Temperature - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature (T_P - 5°C) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T _{smax} to T _P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max

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