ISD, ISQ Series

DESCRIPTION

The ISD dual channel and ISQ quad channel optically coupled isolators consist of an infrared light emitting diode and an NPN silicon photo transistor mounted in a space efficient Dual In Line Plastic Package.

FEATURES

- AC Isolation Voltage 5000V_{RMS}
- BV_{CEO} 70V min - ISD5, ISQ5
  50V min - ISD1, ISQ1, ISD74, ISQ74
- Wide Operating Temperature Range
  −40°C to +105°C
- RoHS Compliant
- UL File E91231 Model “FF”
- VDE Approval 40028086

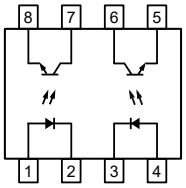
APPLICATIONS

- Programmable Controllers
- Hybrid substrates require high density mounting.

ORDER INFORMATION

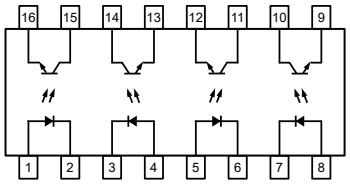
- Add Suffix “X” for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount

ISD



1, 4	Anode
2, 3	Cathode
5. 8	Emitter
6, 7	Collector

ISQ



1, 4, 5, 8	Anode
2, 3, 6, 7	Cathode
9, 12, 13, 16	Emitter
10, 11, 14, 15	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
Pulse Forward Current (Pulse 100µs Frequency 100Hz)	1A
Reverse Voltage	6V
Power Dissipation	70mW

Output

Collector to Emitter Voltage V_{CEO}	
ISD5, ISQ5	70V
ISD1, ISQ1, ISD74, ISQ74	50V
Emitter to Collector Voltage V_{ECO}	6V
Collector Current	50mA
Power Dissipation	150mW

Total Package

Isolation Voltage	5000V_{RMS}
Total Power Dissipation	200mW
Operating Temperature	-40 to +105°C
Storage Temperature	-55 to +125°C
Junction Temperature	125°C
Lead Soldering Temperature (10s)	260°C

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

INPUT

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

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = 1mA ISD5, ISQ5 ISD1, ISQ1, ISD74, ISQ74	 70 50			V
Emitter-Collector Breakdown Voltage	BV_{ECO}	I_E = 10µA	6			V
Collector-Emitter Dark Current	I_{CEO}	V_{CE} = 20V			100	nA

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

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	I_F = 10mA, V_{CE} = 10V				%
		ISD1, ISQ1	20		300	
		ISD5, ISQ5	50		400	
		I_F = 16mA, V_{CE} = 5V	12.5			
		ISD74, ISQ74				
	Saturated CTR	I_F = 10mA, V_{CE} = 0.4V				
		ISD1, ISQ1		75		
		ISD5, ISQ5		100		
		I_F = 16mA, V_{CE} = 0.5V	12.5			
		ISD74, ISQ74				
Collector−Emitter Saturation Voltage	$V_{CE(sat)}$	I_F = 20mA, I_C = 1mA		0.1	0.2	V
Floating Capacitance	C_f	V = 0V, f = 1MHz		0.6	1	pF
Cut-Off Frequency	fc	V_{CE} = 5V, I_C = 2mA R_L = 100Ω -3dB		80		kHz
Output Rise Time	t_r	V_{CE} = 2V Ic = 2mA R_L = 100Ω		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% Note 1	5000			V_{RMS}
Input to Output Isolation Resistance	R_{ISO}	V_{IO}= 500V, RH = 40% to 60% Note 1	$5x10^{10}$	$1x10^{11}$		Ω

Note 1 : Measure with input leads shorted together and output leads shorted together.

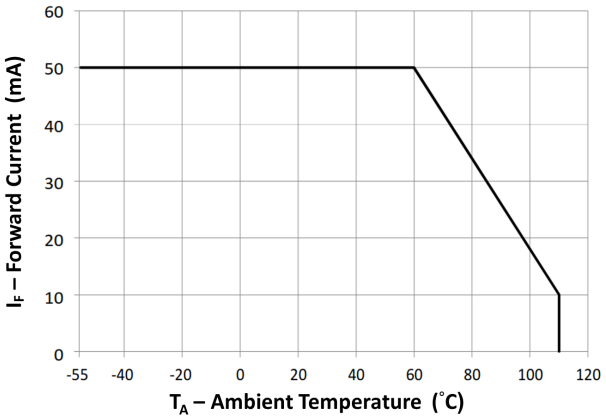


Fig 1 Forward Current vs Ambient Temperature

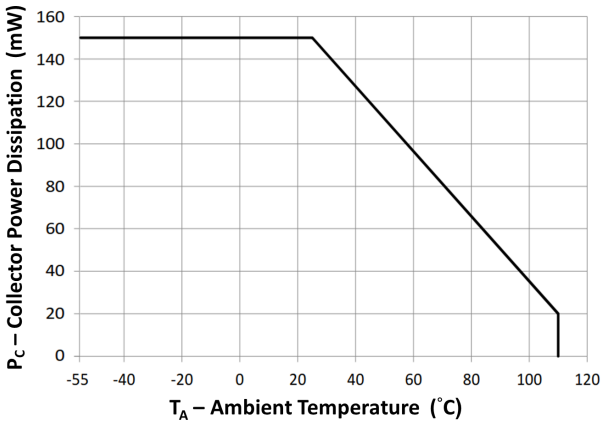


Fig 2 Collector Power Dissipation vs Ambient Temperature

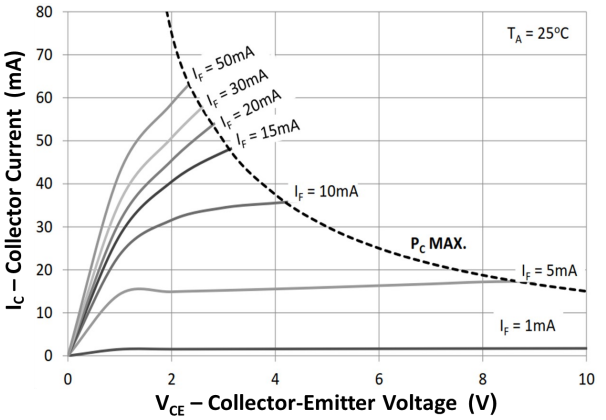


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

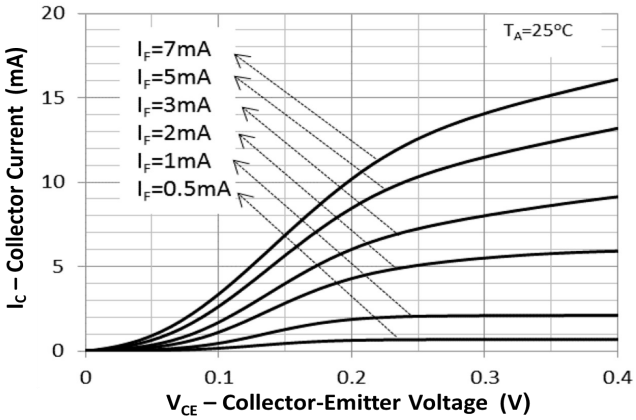


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

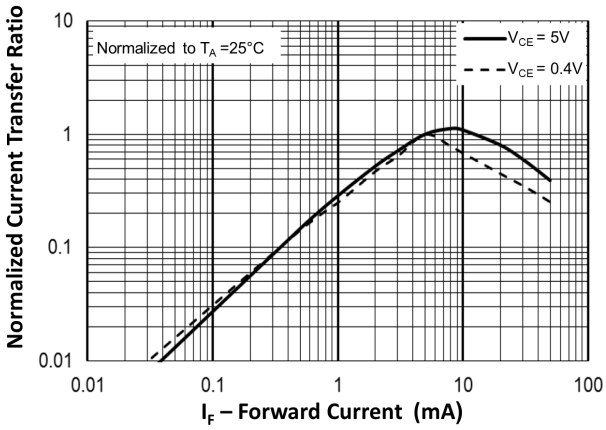


Fig 5 Current Transfer Ratio vs Forward Current

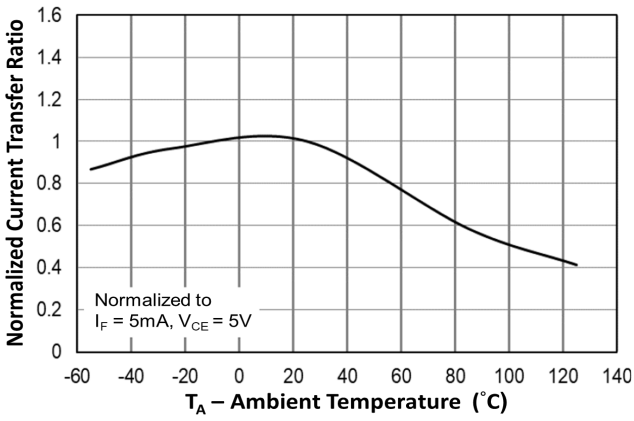


Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature

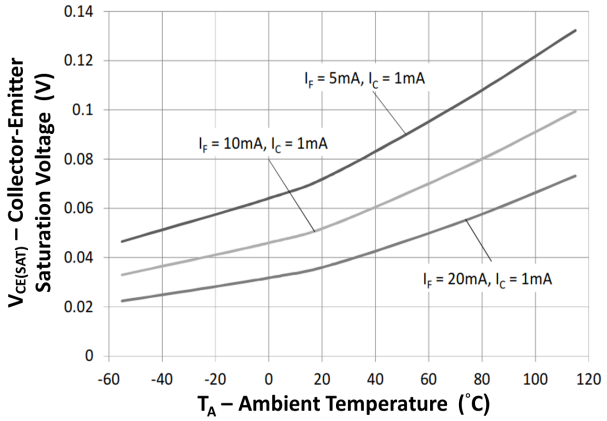


Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature

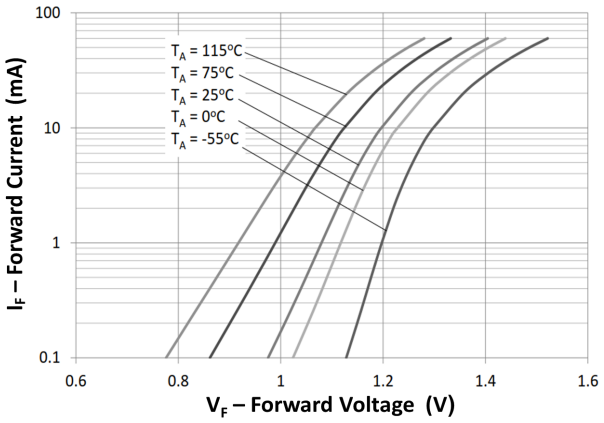


Fig 8 Forward Current vs Forward Voltage

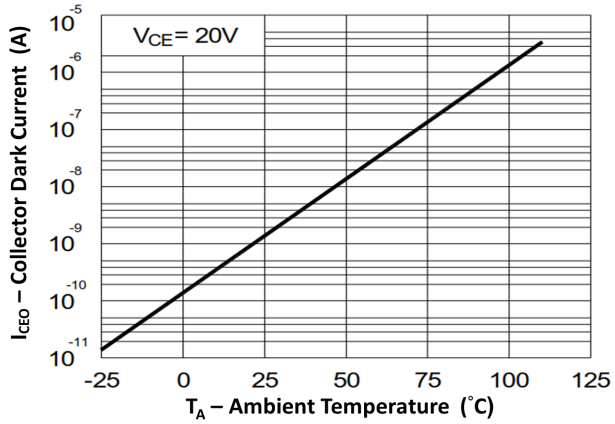


Fig 9 Collector Dark Current vs Ambient Temperature

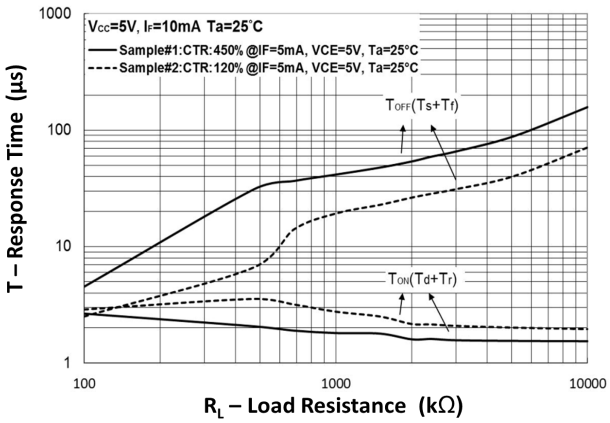


Fig 10 Response Time vs Load Resistance

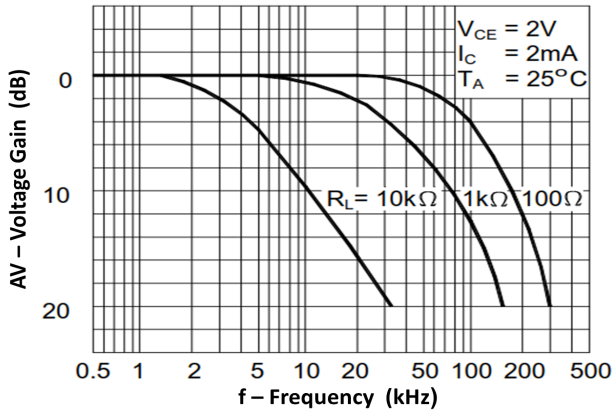
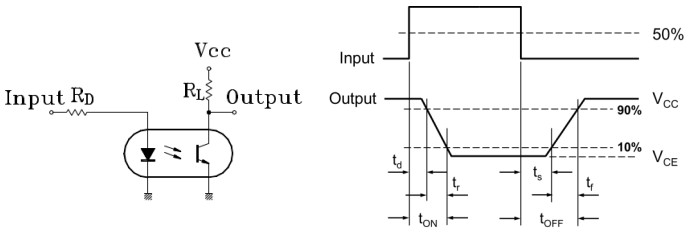
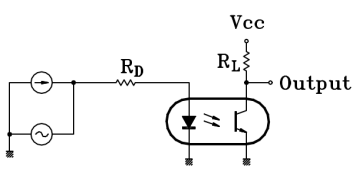


Fig 11 Frequency Response



Response Time Test Circuit



Frequency Response Test Circuit

ORDER INFORMATION

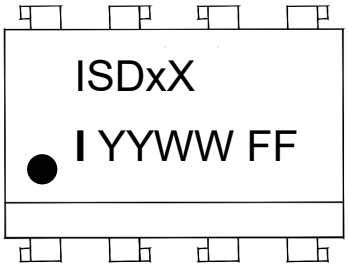
ISD Series (UL Approval)			
After PN	**PN**	**Description**	**Packing quantity**
None	ISD1, ISD5, ISD74	Standard DIP8	50 pcs per tube
G	ISD1G, ISD5G, ISD74G	10mm Lead Spacing	50 pcs per tube
SM	ISD1SM, ISD5SM, ISD74SM	Surface Mount	50 pcs per tube
SMT&R	ISD1SMT&R, ISD5SMT&R ISD74SMT&R	Surface Mount Tape & Reel	1000 pcs per reel

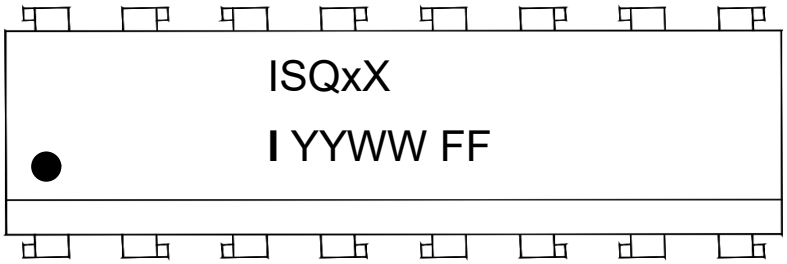
ISD Series (UL and VDE Approvals)			
After PN	**PN**	**Description**	**Packing quantity**
None	ISD1X, ISD5X, ISD74X	Standard DIP8	50 pcs per tube
G	ISD1XG, ISD5XG, ISD74XG	10mm Lead Spacing	50 pcs per tube
SM	ISD1XSM, ISD5XSM, ISD74XSM	Surface Mount	50 pcs per tube
SMT&R	ISD1XSMT&R, ISD5XSMT&R ISD74XSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISQ Series (UL Approval)			
After PN	**PN**	**Description**	**Packing quantity**
None	ISQ1, ISQ5, ISQ74	Standard DIP8	25pcs per tube
G	ISQ1G, ISQ5G, ISQ74G	10mm Lead Spacing	25 pcs per tube
SM	ISQ1SM, ISQ5SM, ISQ74SM	Surface Mount	25 pcs per tube
SMT&R	ISQ1SMT&R, ISQ5SMT&R, ISQ74SMT&R	Surface Mount Tape & Reel	750 pcs per reel

ISQ Series (UL and VDE Approvals)			
After PN	**PN**	**Description**	**Packing quantity**
None	ISQ1X, ISQ5X, ISQ74X	Standard DIP8	25pcs per tube
G	ISQ1XG, ISQ5XG, ISQ74XG	10mm Lead Spacing	25 pcs per tube
SM	ISQ1XSM, ISQ5XSM, ISQ74XSM	Surface Mount	25 pcs per tube
SMT&R	ISQ1XSMT&R, ISQ5XSMT&R, ISQ74XSMT&R	Surface Mount Tape & Reel	750 pcs per reel

DEVICE MARKING



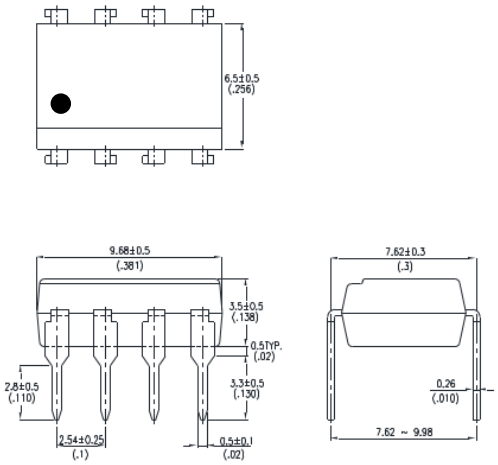


ISDx / ISQx	Device Part Number where x is “1”, “5” or “74”
X	VDE version
I	Isocom
YY	Year code
WW	Week code
FF	UL Model

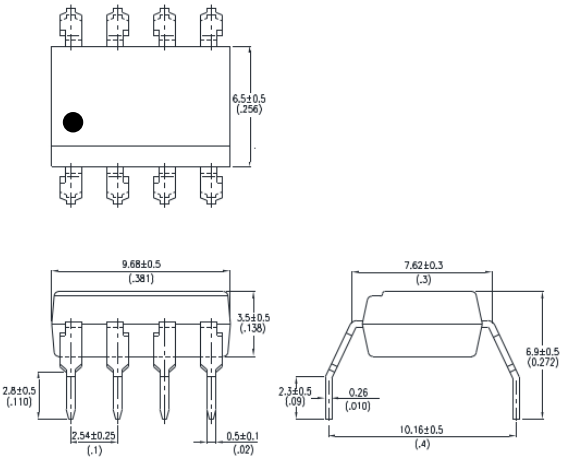
PACKAGE DIMENSIONS in mm (inch)

ISDx

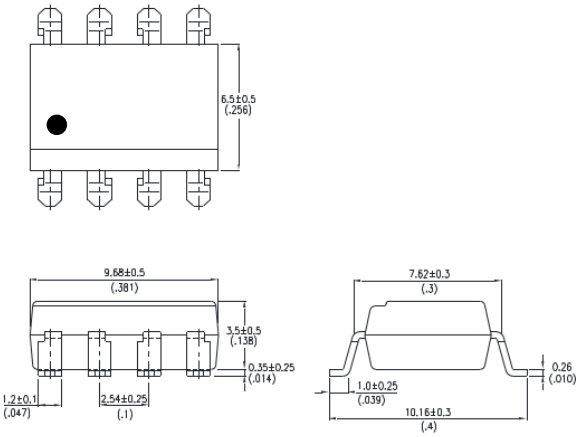
DIP



G Form



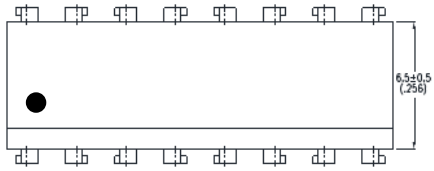
SMD

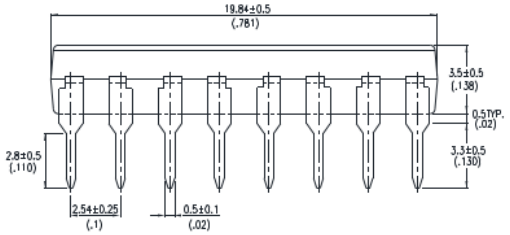


PACKAGE DIMENSIONS in mm (inch)

ISQx

DIP





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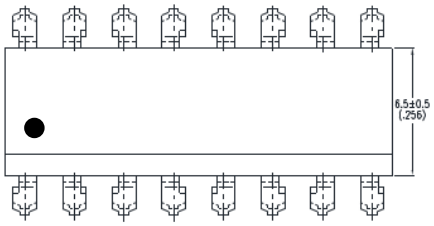
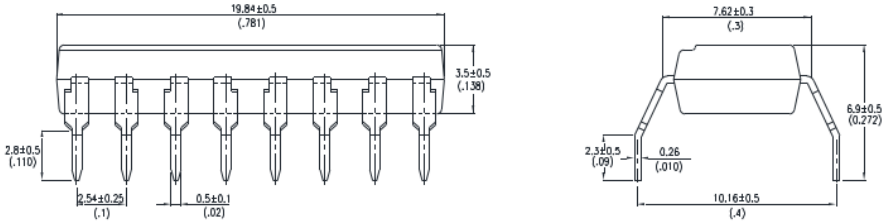
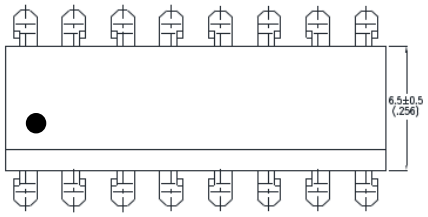
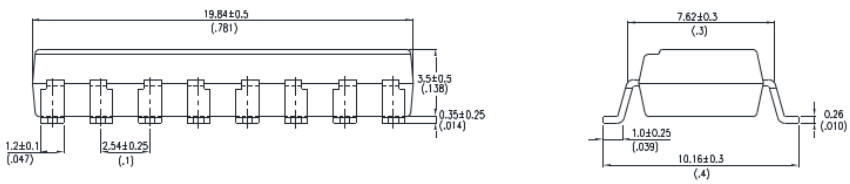




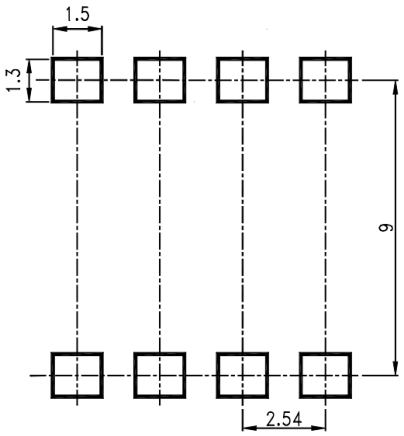
SMD



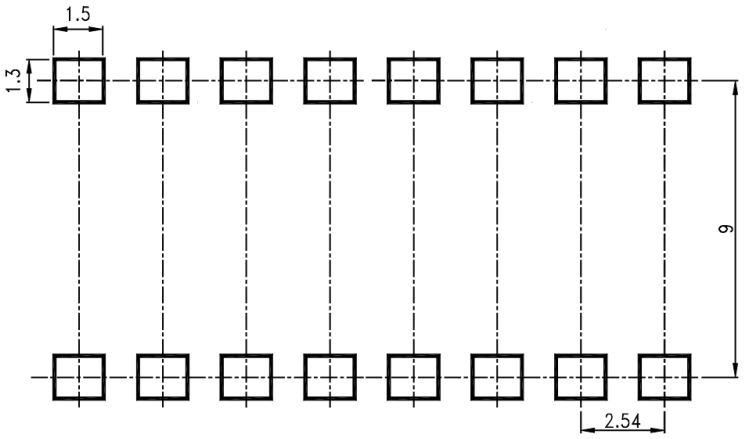


RECOMMENDED PAD LAYOUT FOR SMD (mm)

ISDxSM

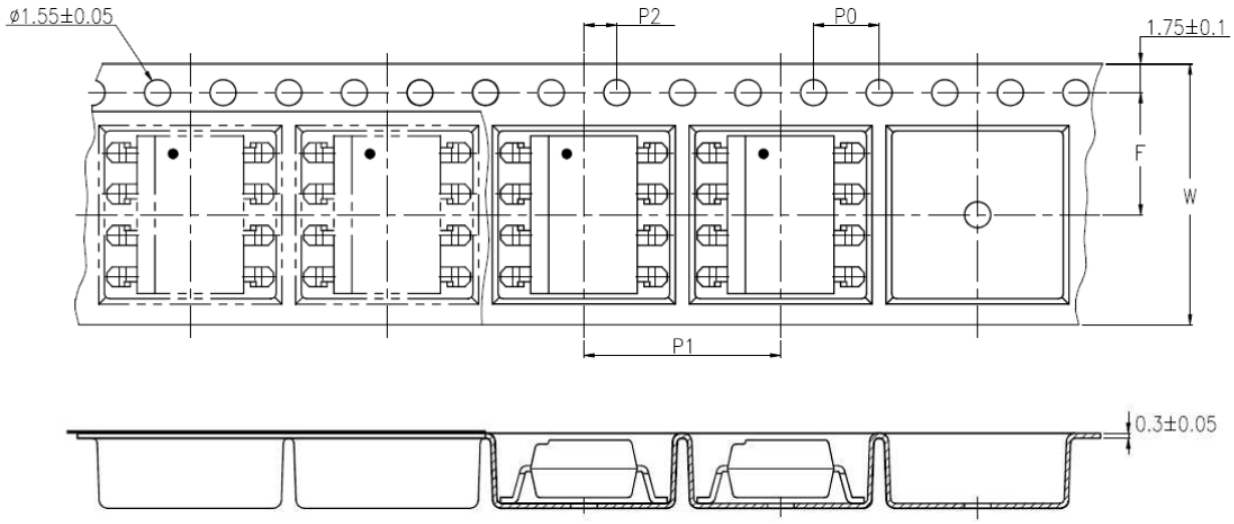


ISQxSM



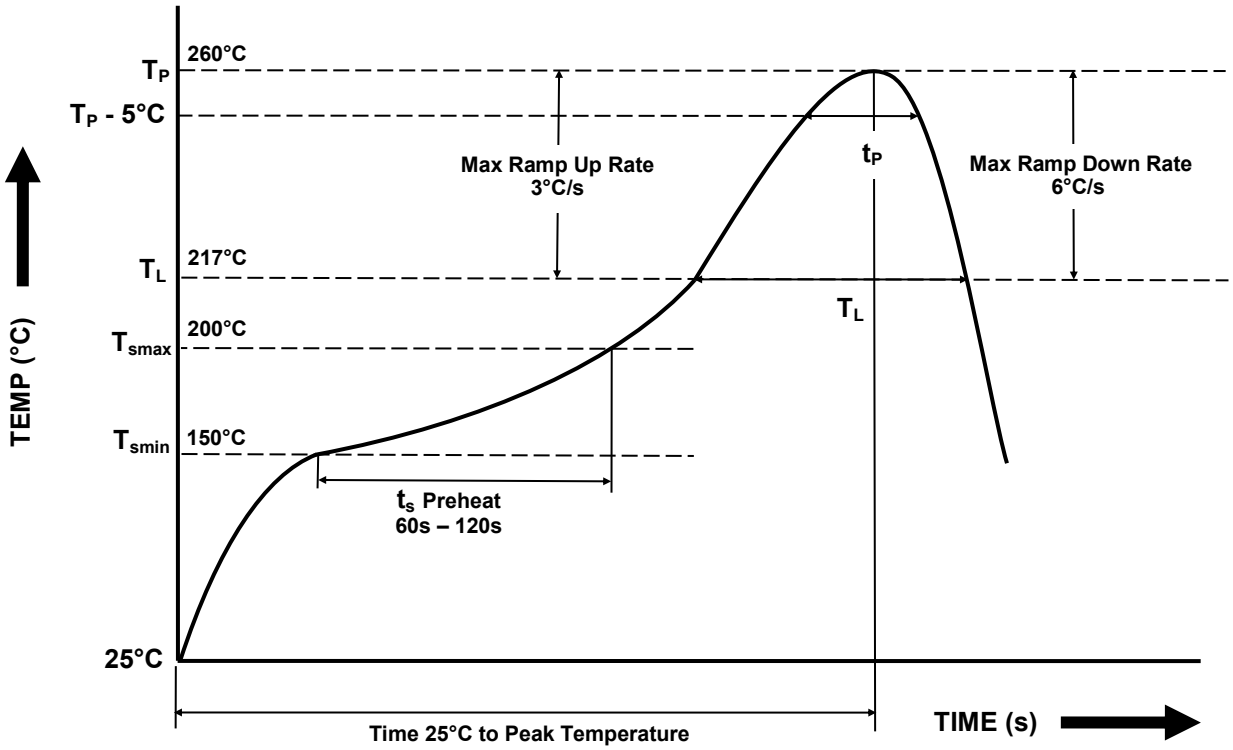
TAPE AND REEL PACKAGING

ISDxSMT&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)

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

ISOCOM COMPONENTS

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