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CT415 Series

DC Input 4-Pin Mini-Flat DMC-Isolator® Photodarlington Optocoupler

Features

- High isolation 3750 VRMS
- Patented coplanar structure DMC-Isolator®
- Various CTR selection available
- DC input with Darlington output
- Operating Temperature range - 55 °C to 110 °C
- External Creepage ≥ 5.0mm
- Distance Through Isolation ≥ 0.4mm
- Clearance Distance ≥ 5.0mm
- RoHS and REACH Compliance
- Halogen Free Compliance
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5(VDE0884-5)
  - ✓ CQC – GB4943.1, GB8898 (14001105803)
  - ✓ IEC62368 (FI/41119)

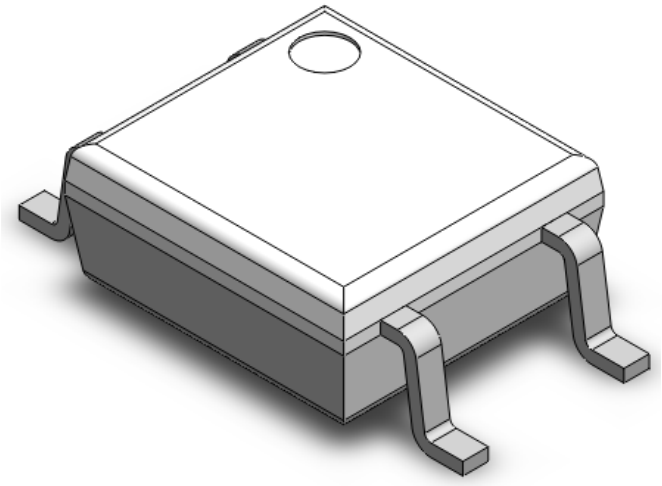
Description

The CT415 series consists of a photodarlington transistor optically coupled to an Infrared-emitting diode in a 4-lead Mini-Flat DMC-Isolator® package with bending option.

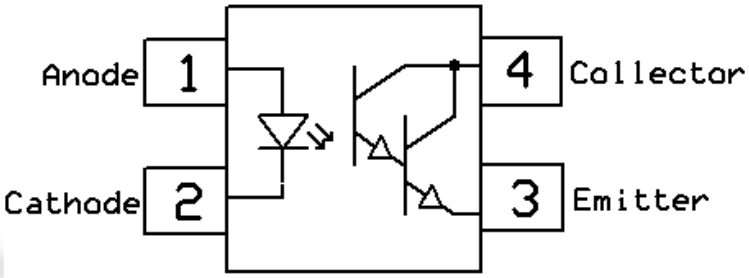
Applications

- Power supply regulators
- Digital logic outputs
- Microprocessor inputs

Package Outline



Schematic



Absolute Maximum Ratings T_A = 25°C, unless otherwise specified

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{ISO}	Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.)	3750	V_{RMS}	
T_{OPR}	Operating temperature	-55 ~ +110	°C	
T_{STG}	Storage temperature	-55 ~ +150	°C	
T_{SOL}	Soldering temperature (For 10 seconds)	260	°C	
P_{TOT}	Total power dissipation	170	mW	
Emitter				
I_F	Forward current	50	mA	
$I_{F(TRANS)}$	Peak transient current (≤1μs P.W,300pps)	1	A	
V_R	Reverse voltage	6	V	
P_D	Power dissipation	70	mW	
Detector				
P_D	Power dissipation	150	mW	
B_{VCEO}	Collector-Emitter Breakdown Voltage	35	V	
B_{VECO}	Emitter-Collector Breakdown Voltage	7	V	
I_C	Collector Current	80	mA	

Electrical Characteristics T_A = 25°C (unless otherwise specified)

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_F	Forward voltage	I_F=10mA		1.4	1.6	V	
I_R	Reverse Current	V_R = 6V	-	-	5	μA	
C_{IN}	Input Capacitance	f= 1MHz	-	30	250	pF	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
B_{VCEO}	Collector-Emitter Breakdown	I_C= 100μA	35	-	-	V	
B_{VECO}	Emitter-Collector Breakdown	I_E= 100μA	7	-	-	V	
I_{CEO}	Collector-Emitter Dark Current	V_{CE}= 10V, I_F=0mA	-	-	100	nA	

Transfer Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	CT415	I_F= 1mA, V_{CE}= 2V	600	-	-	%	
		CT415A		3000	-	6500		
		CT415B		5500	-	-		
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage		I_F= 20mA, I_C= 5mA	-	0.8	1	V	
R_{IO}	Isolation Resistance		V_{IO}= 500V_{DC}	$5x10^{10}$			Ω	
C_{IO}	Isolation Capacitance		f= 1MHz		0.5	1	pF	

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
t_r	Rise Time	I_C= 10mA, V_{CE}= 2V, R_L= 100Ω	-	-	300	μs	
t_f	Fall Time		-	-	250		

Typical Characteristic Curves *T_A = 25°C, unless otherwise specified*

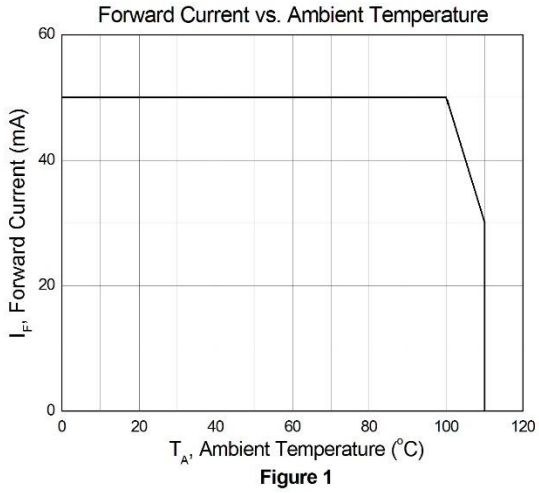


Figure 1

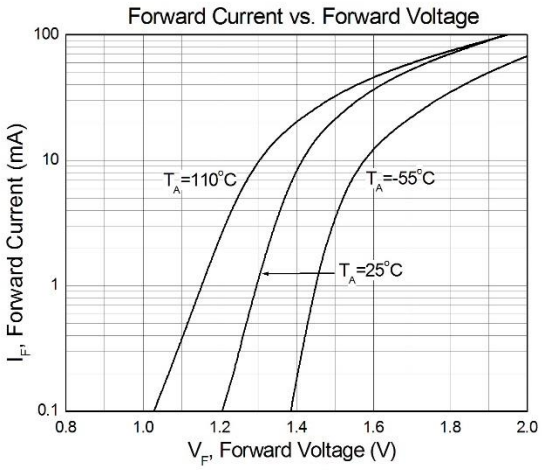


Figure 2

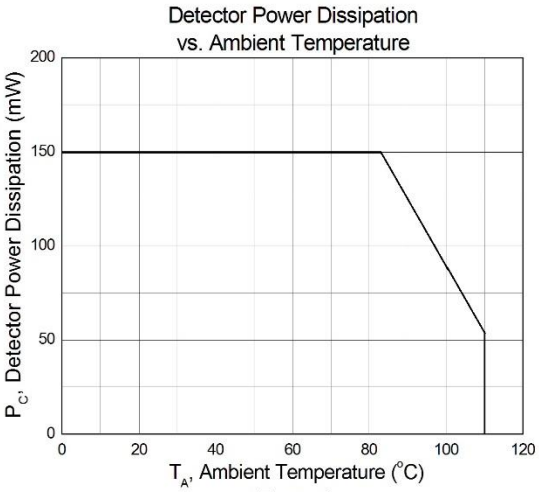


Figure 3

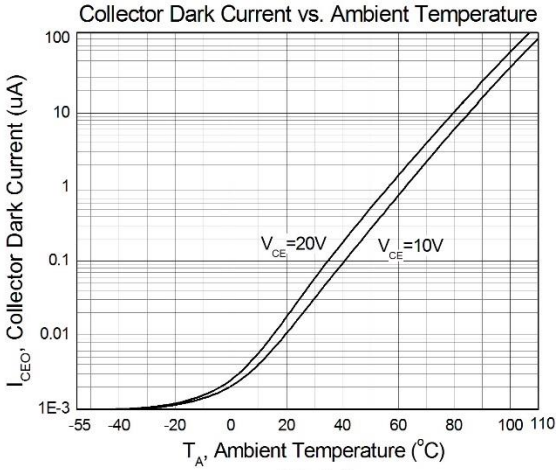


Figure 4

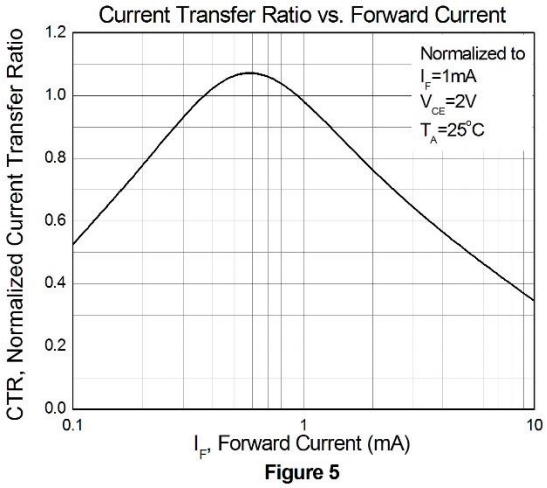


Figure 5

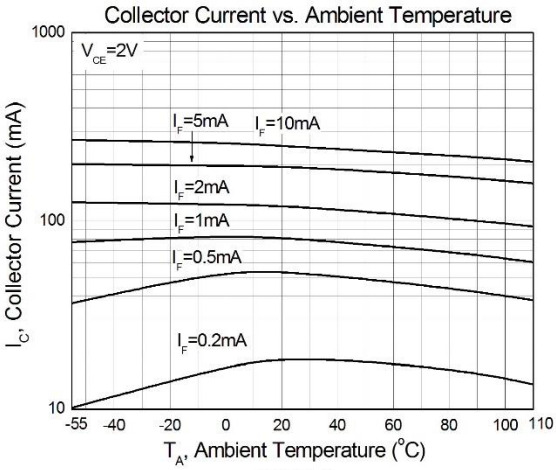


Figure 6

Typical Characteristic Curves *T_A = 25°C, unless otherwise specified*

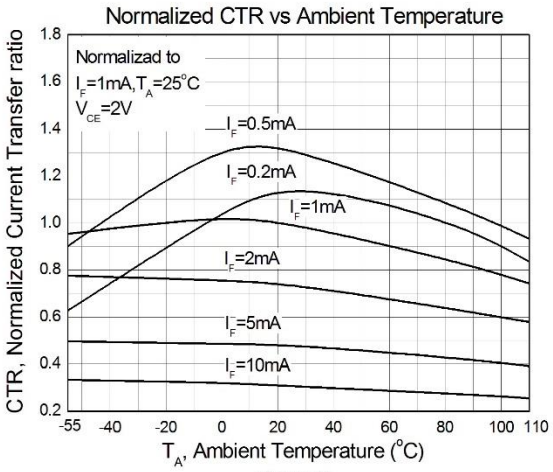


Figure 7

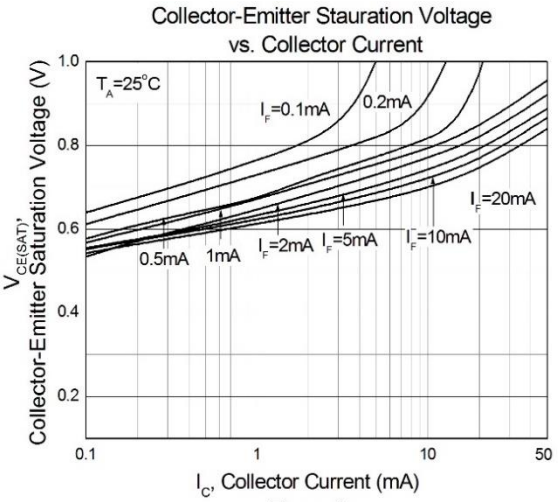


Figure 8

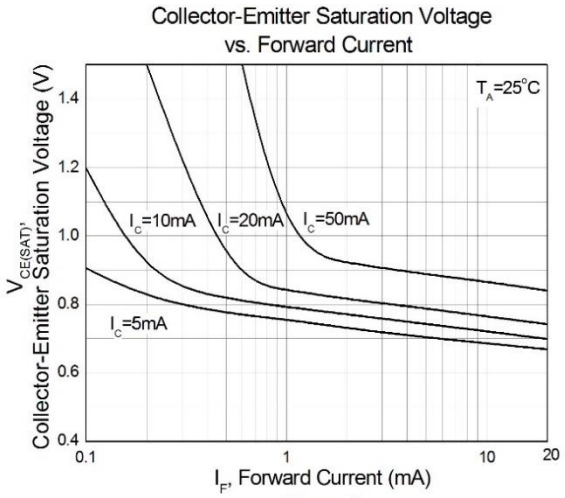


Figure 9

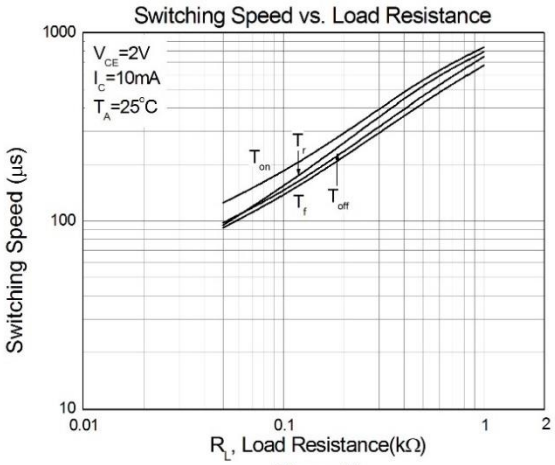


Figure 10

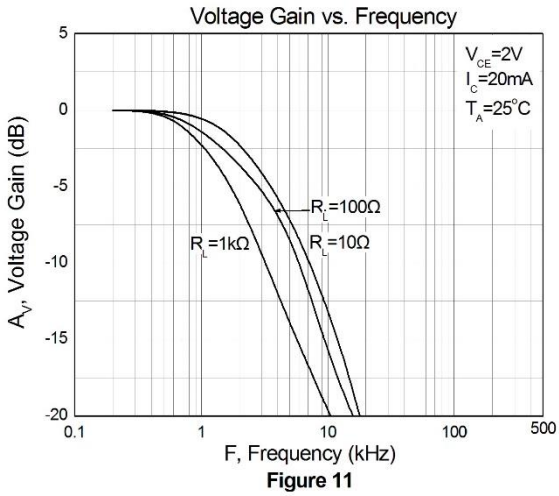


Figure 11

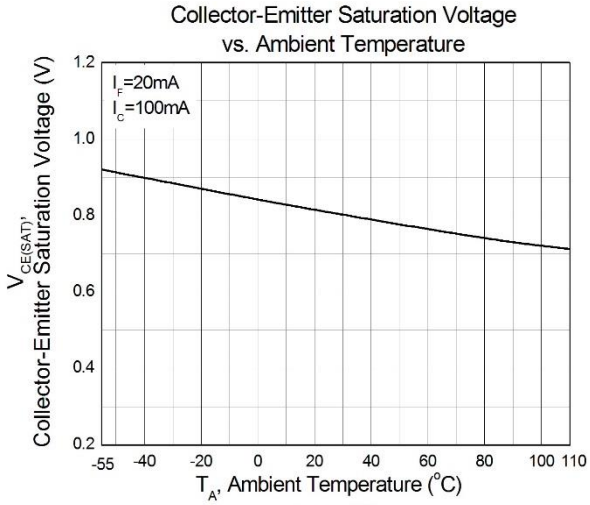


Figure 12

Test Circuit

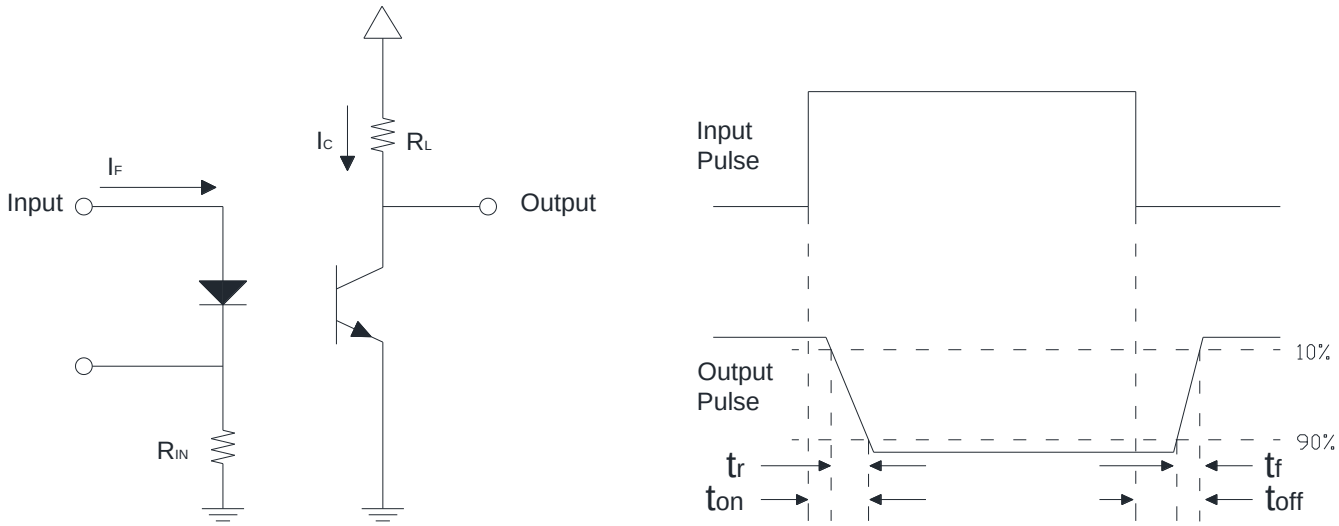
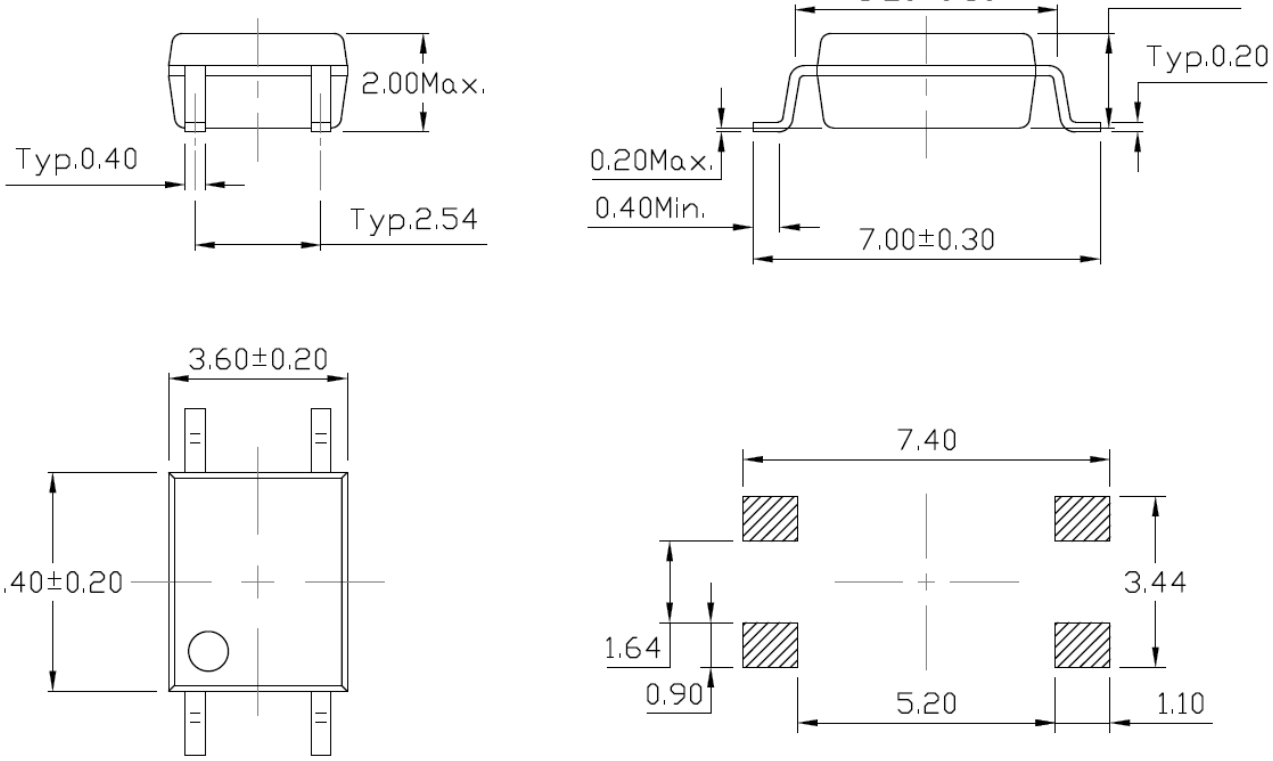
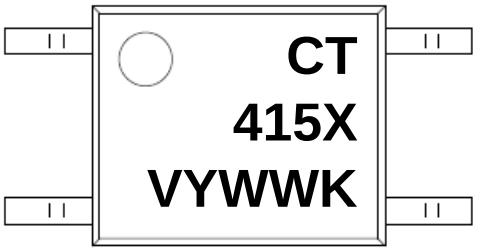


Figure 13: Switching Time Test Circuit

Package Dimension *Dimensions in mm unless otherwise stated*



Marking Information



Note:

CT	: Denotes “CT Micro”
415	: Part Number
X	: CTR Rank
V	: VDE Safety Mark Option (Blank or V)
Y	: One Digit Year Code
WW	: Two Digit Work Week
K	: Manufacturing Code

Ordering Information

CT415X (V)(Z)

CT = Denotes “CT Micro”

415 = Part Number

X = CTR Rank Option (Blank, A or B)

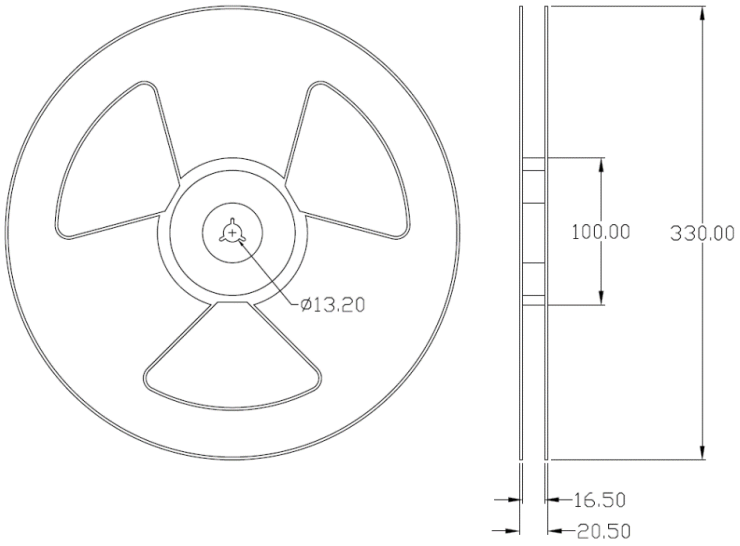
V = VDE Safety Mark Option (Blank or V)

Z = Tape and Reel Option (T1 or T2)

Option	*Description*	*Quantity*
T1	Surface Mount Lead Forming – With Option 1 Taping	3000 Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Taping	3000 Units/Reel

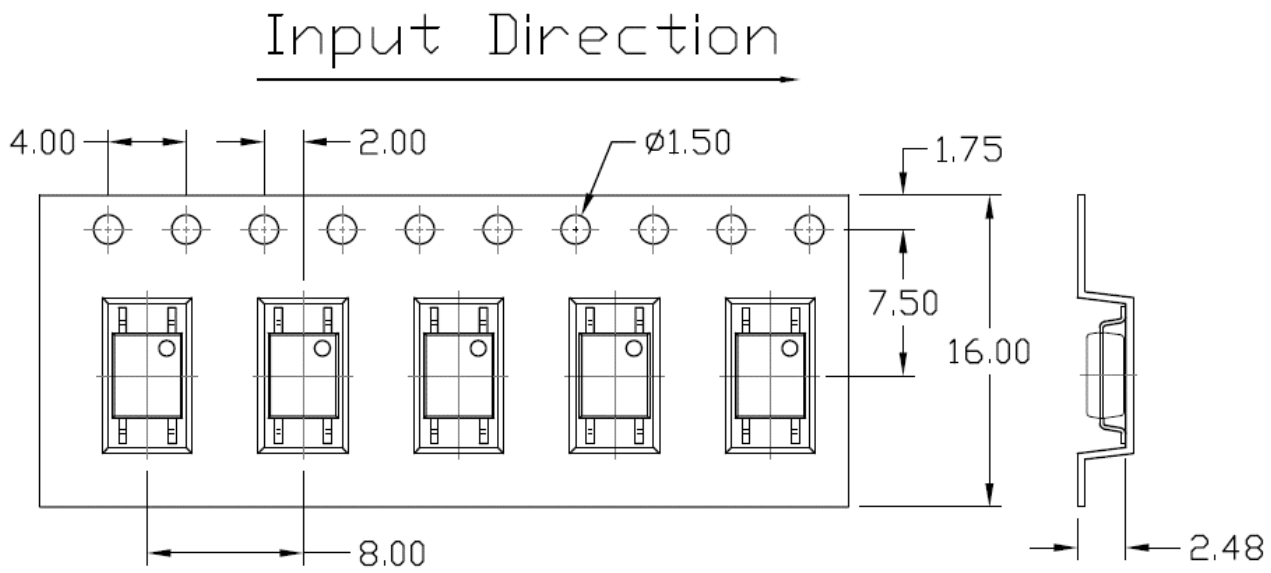
Reel Dimension *All dimensions are in mm, unless otherwise stated*

Option T1/T2

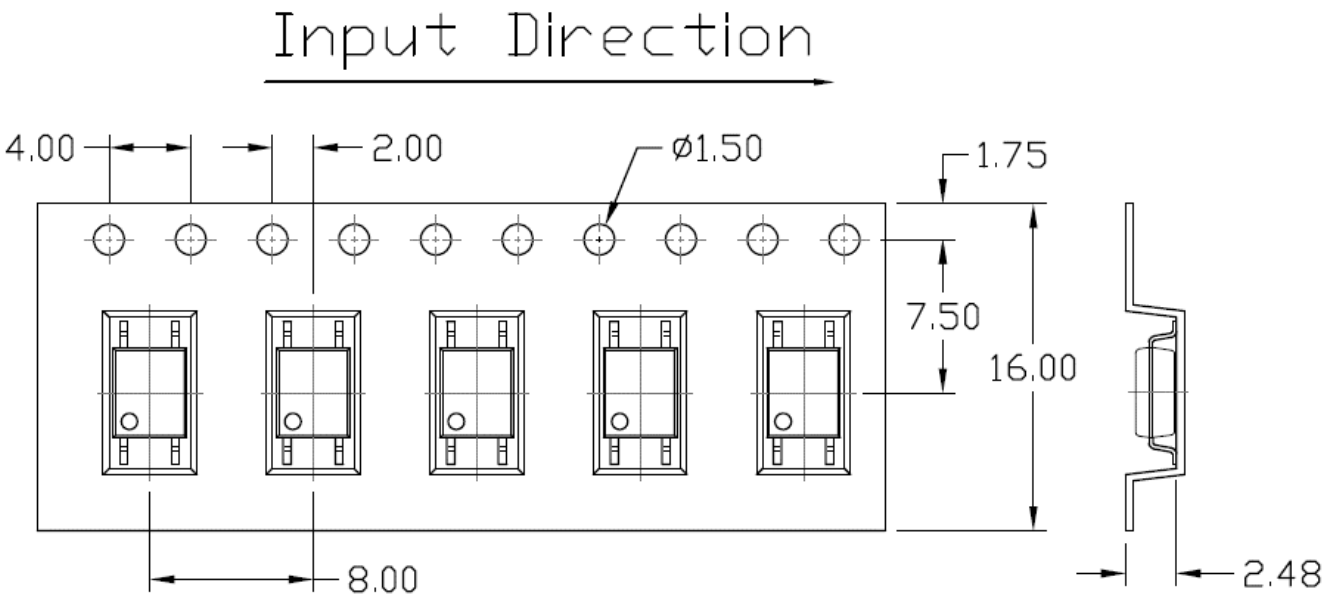


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option (T1)



Option (T2)



Solderability spec (Follow the JEDEC standard JESD22-B102)

Reflow Soldering: Immersed surface, other than the end of pin as cut-surface, must be covered by solder.

Solder-Bath: More than 95% of the electrode must be covered with solder.

Wave soldering (Follow the JEDEC standard JESD22-A111)

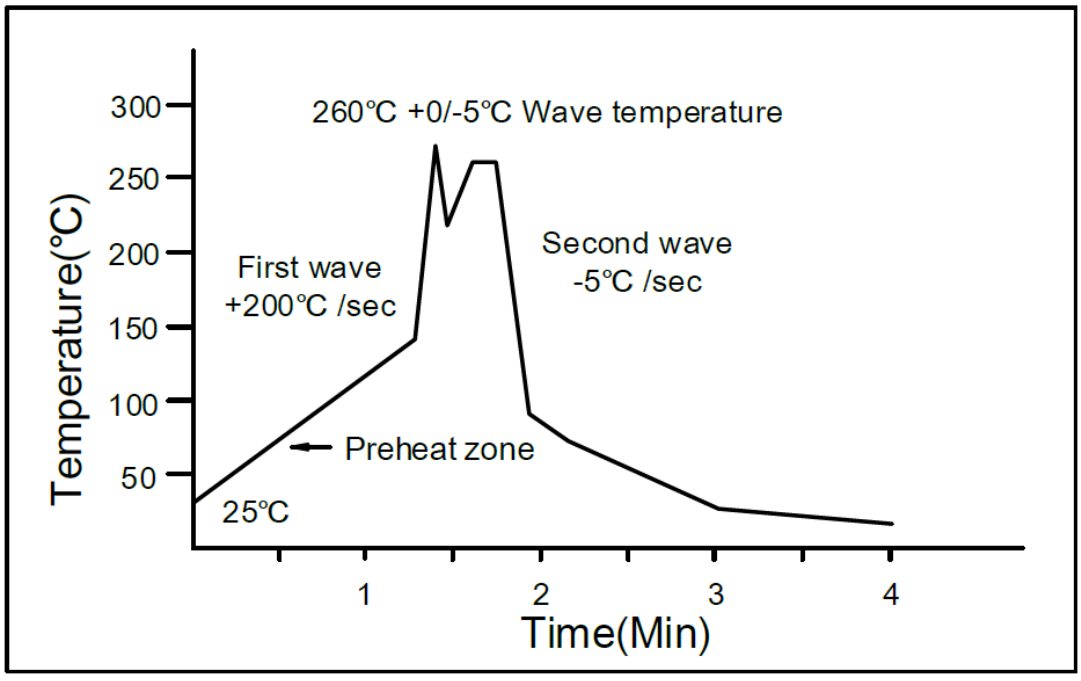
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C.

Time: 10 sec.

Preheat temperature: 25 to 140˚C.

Preheat time: 30 to 80 sec.



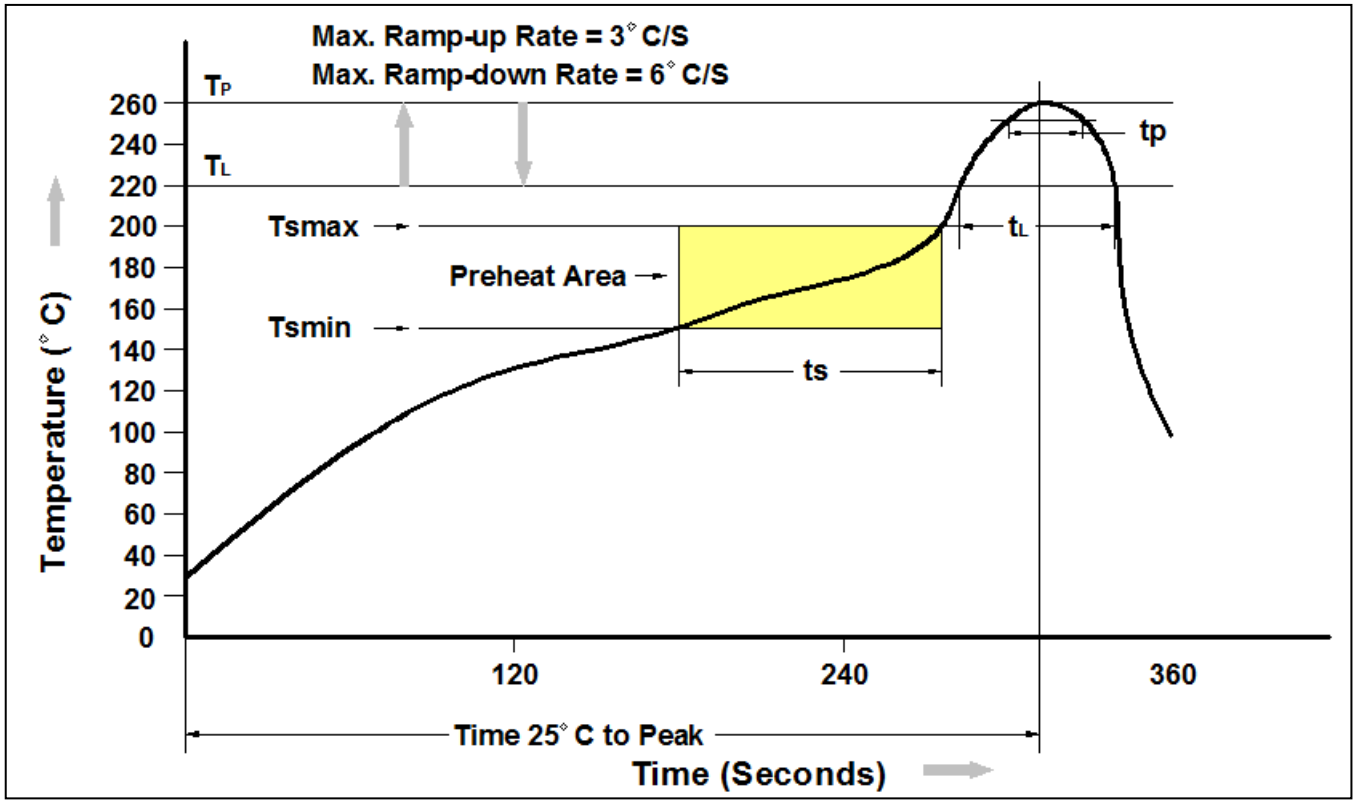
Iron soldering (Follow the standard MIL-STD 202G, Method 210F)

Allow single lead soldering in every single process.

One time soldering is recommended. Temperature: 350±10˚C

Time: 5 sec max.

Reflow Profile (Follow the JEDEC standard J-STD-020)



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

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