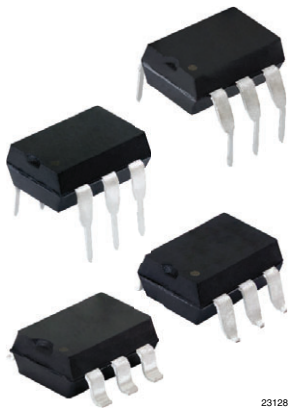
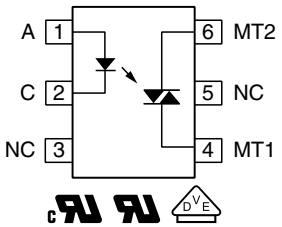
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Optocoupler, Phototriac Output, Non-Zero Crossing





FEATURES

- I_{TRMS} = 300 mA
- High static dV/dt < 10 000 V/µs
- Electrically insulated between input and output circuit
- Microcomputer compatible - very low trigger current
- Trigger current
  - (I_{FT} < 1.2 mA) BRT12**F**
  - (I_{FT} < 2 mA) BRT11**H**, BRT12**H**, BRT13**H**
  - (I_{FT} < 3 mA) BRT12**M**, BRT13**M**
- Non-zero voltage detectors high input sensitivity
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

LINKS TO ADDITIONAL RESOURCES

Related Documents

DESCRIPTION

The BRT11, BRT12, and BRT13 product family consists of AC optocouplers non-zero voltage detectors consisting of two electrically insulated lateral power ICs which integrate a thyristor system, a photo detector and noise suppression at the output and an IR GaAs diode input.

APPLICATIONS

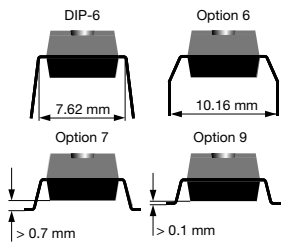
- Industrial controls
- Office equipment
- Consumer appliances

AGENCY APPROVALS

- UL 1577
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1

ORDERING INFORMATION

B	R	T	1	#	x	-	X	0	#	#	T
PART NUMBER							PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED / PACKAGE	V_{DRM} (V)				
	≤ 400	≤ 600			≤ 800
UL	**I_{FT} = 2 mA**	**I_{FT} = 1.2 mA**	**I_{FT} = 2 mA**	**I_{FT} = 3 mA**	**I_{FT} = 2 mA**
DIP-6	BRT11H	BRT12F	BRT12H	BRT12M	BRT13H
DIP-6, 400 mil, option 6	-	-	BRT12H-X006	-	BRT13H-X006
SMD-6, option 7	-	BRT12F-X007T	BRT12H-X007T	-	BRT13H-X007T (1)
SMD-6, option 9	-	-	BRT12H-X009T	-	BRT13H-X009T
UL, VDE	**I_{FT} = 2 mA**	**I_{FT} = 1.2 mA**	**I_{FT} = 2 mA**	**I_{FT} = 3 mA**	**I_{FT} = 2 mA**
DIP-6	-	-	BRT12H-X001	BRT12M-X001	-
DIP-6, 400 mil, option 6	-	-	BRT12H-X016	-	-
SMD-6, option 7	-	-	-	-	BRT13H-X017T

Note

(1) Also available in tube, do not put T on the end

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Reverse voltage			V_R	6	V
Forward current			I_F	20	mA
Surge forward current			I_{FSM}	1.5	A
Power dissipation	t ≤ 10 µs		P_{diss}	30	mW
OUTPUT					
Repetitive peak off-state voltage		BRT11	V_{DRM}	400	V
		BRT12	V_{DRM}	600	V
		BRT13	V_{DRM}	800	V
RMS on-state current			I_{TRMS}	300	mA
Single cycle surge current	50 Hz		I_{TSM}	3	A
Power dissipation			P_{diss}	600	mW
COUPLER					
Maximum power dissipation			P_{tot}	630	mW
Reference voltage in accordance with VDE 0110 b			V_{ref}	500	V_{RMS}
Reference voltage in accordance with VDE 0110 b (insulation group C)			V_{ref}	600	V_{DC}
Storage temperature range			T_{stg}	-40 to +150	°C
Ambient temperature range			T_{amb}	-40 to +100	°C

Notes

- 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. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(1) Test AC voltage in accordance with DIN 57883, June 1980

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 10 mA		V_F	-	1.1	1.35	V
Reverse current	V_R = 6 V		I_R	-	-	10	µA
Thermal resistance, junction to ambient (1)			R_{thJA}	-	-	750	°C/W
OUTPUT							
Peak off-state voltage	$I_{D(RMS)}$ = 100 µA	BRT11	V_{DM}	-	400	-	µA
		BRT12		-	600	-	µA
		BRT13		-	800	-	µA
Off-state current	T_C = 80 °C, V_{DRM}		I_D	-	0.5	100	µA
On-state voltage	I_T = 300 mA		V_T	-	-	2.3	V
Pulse current	t_p ≤ 5 µs, f = 100 Hz, dI_{tp}/dt ≤ 8 A/µs		I_{tp}	-	-	2	A
Critical rate of rise of off-state voltage	V_D = 0.67 V_{DRM}, T_j = 25 °C		dV/dt_{cr}	10	-	-	kV/µs
	V_D = 0.67 V_{DRM}, T_j = 80 °C		dV/dt_{cr}	5	-	-	kV/µs
Critical rate of rise of voltage at current commutation	V_D = 0.67 V_{DRM}, T_j = 25 °C, dI/dt_{crq} ≤ 15 A/ms		dV/dt_{crq}	10	-	-	kV/µs
	V_D = 0.67 V_{DRM}, T_j = 80 °C, dI/dt_{crq} ≤ 15 A/ms		dV/dt_{crq}	5	-	-	kV/µs
Critical rate of rise of on-state at current			dI/dt_{cr}	8	-	-	A/µs
Holding current	V_D = 10 V		I_H	-	80	500	µA
Thermal resistance, junction to ambient			R_{thJA}	-	-	125	°C/W

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
COUPLER							
Trigger current	V_D = 10 V, F - versions		I_{FT}	-	-	1.2	mA
	V_D = 10 V, H - versions		I_{FT}	0.4	-	2	mA
	V_D = 10 V, M - versions		I_{FT}	0.8	-	3	mA
Trigger current temperature gradient			$\Delta I_{FT}/\Delta T_j$	-	7	14	µA/°C
Capacitance (input to output)	f = 1 MHz, V_R = 0 V		C_{IO}	-	-	2	pF

Notes

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

(1) Static air, SITAC soldered in PCB or base plate

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	V_{ISO}	4420	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	10 000	V_{peak}
Maximum repetitive peak isolation voltage		V_{IORM}	890	V_{peak}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Safety temperature		T_S	175	°C
Creepage distance	DIP-6; SMD-6, option 7; SMD-6, option 9		≥ 7	mm
Clearance distance			≥ 7	mm
Creepage distance	DIP-6, option 6		≥ 8	mm
Clearance distance			≥ 8	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

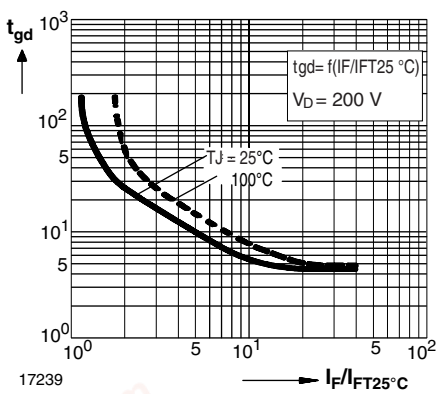


Fig. 1 - Typical Trigger Delay Time

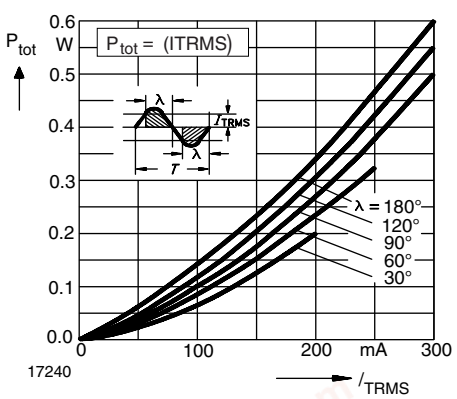


Fig. 2 - Power Dissipation 60 Hz to 60 Hz Line Operation

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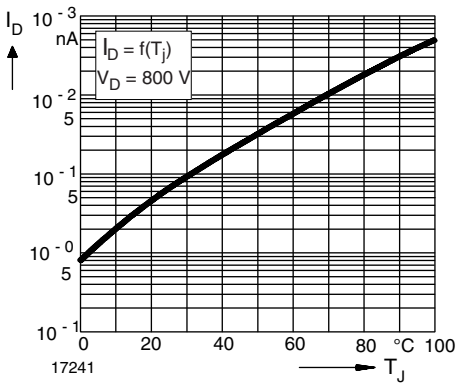


Fig. 3 - Typical Off-State Current

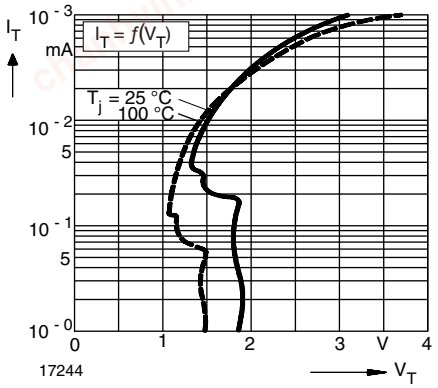


Fig. 6 - Typical Output Characteristics

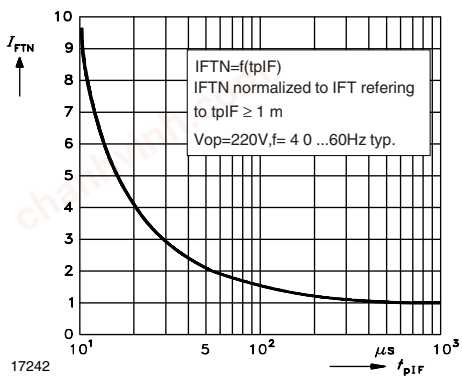


Fig. 4 - Pulse Trigger Current

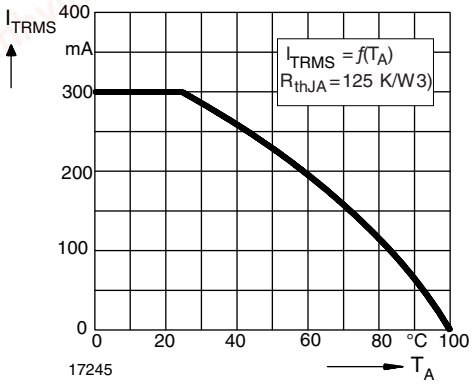


Fig. 7 - Current Reduction

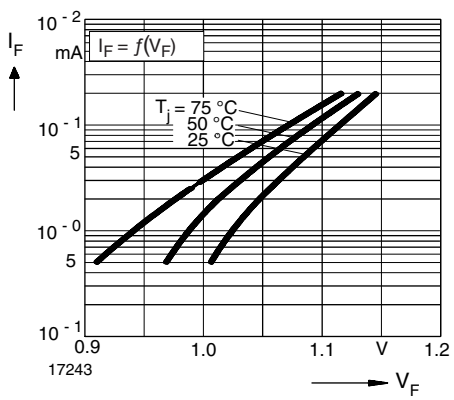


Fig. 5 - Typical Input Characteristics

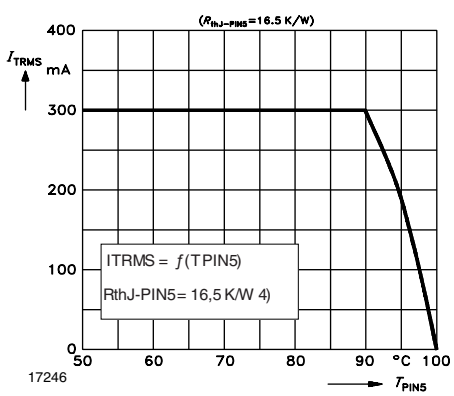


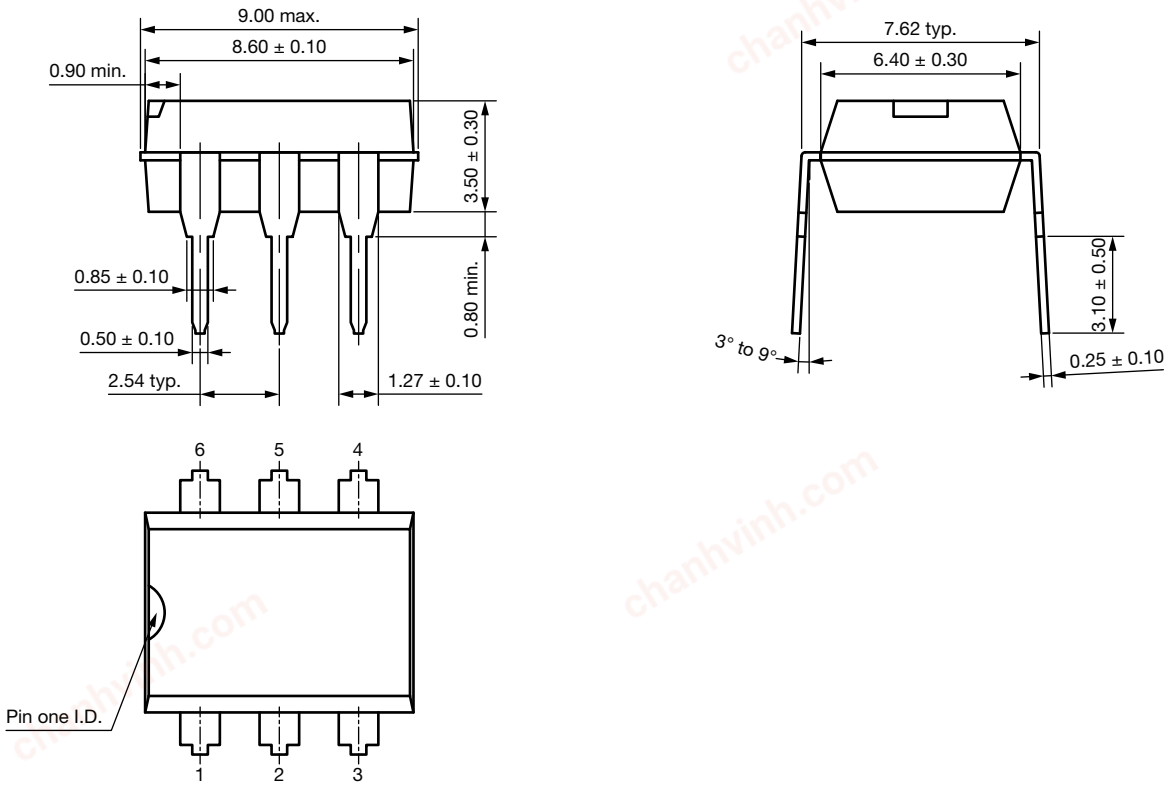
Fig. 8 - Current Reduction

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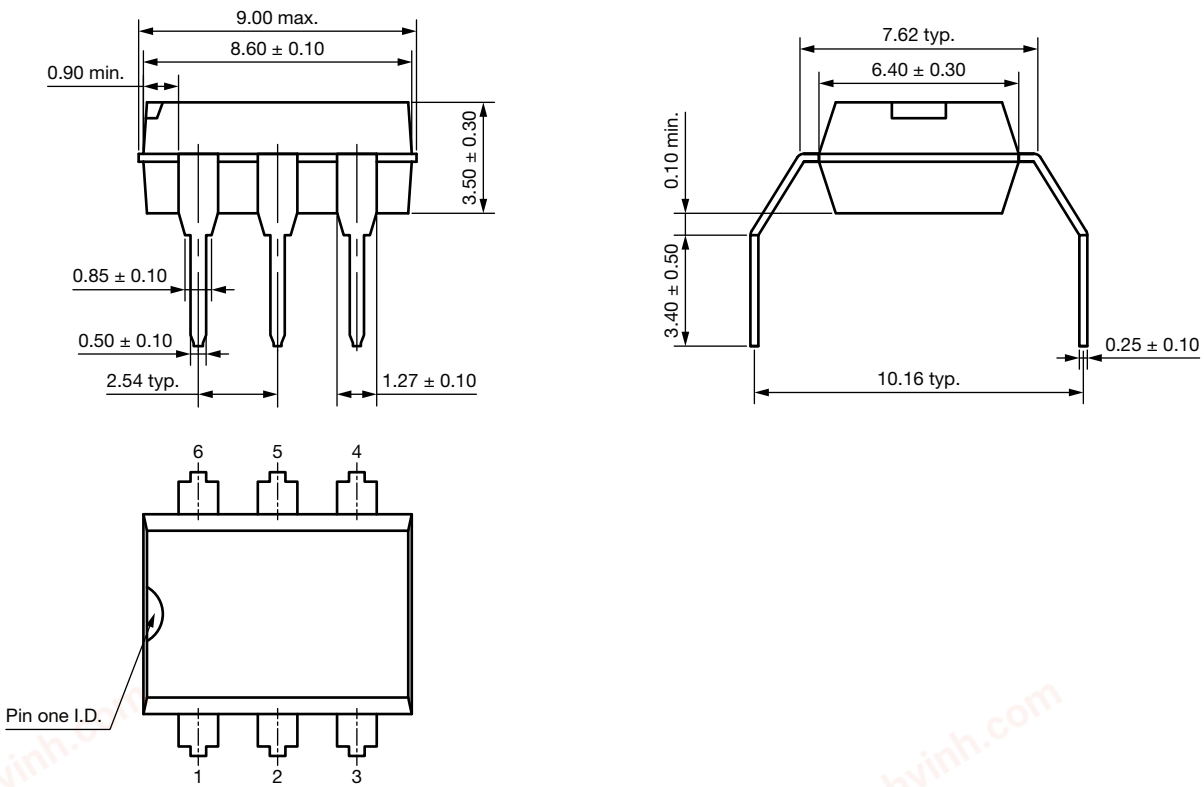
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PACKAGE DIMENSIONS in millimeters

DIP-6



DIP-6, 400 mil (option 6)

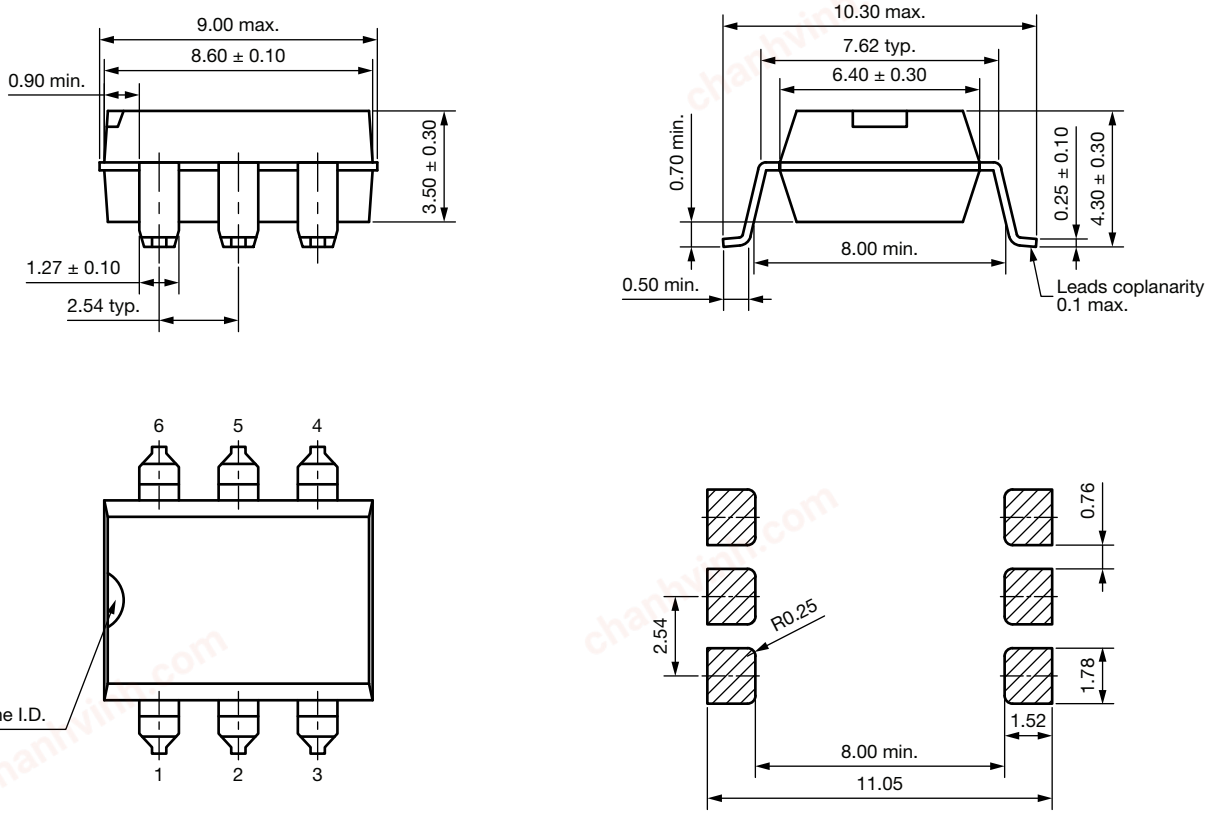


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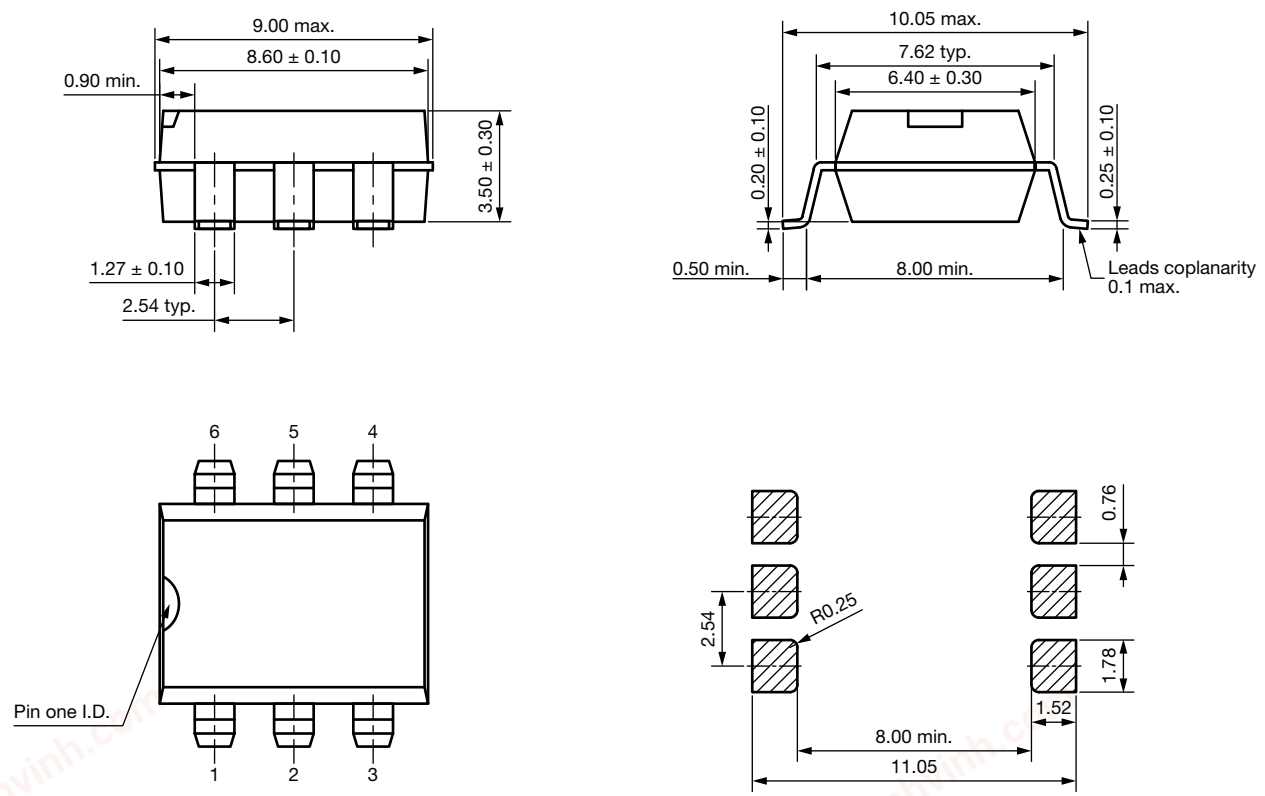
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SMD-6 (option 7)



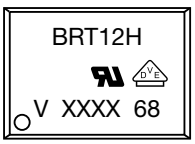
SMD-6 (option 9)



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PACKAGE MARKING (example)



Notes

- XXXX = LMC (lot marking code)
- VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

SOLDER PROFILES

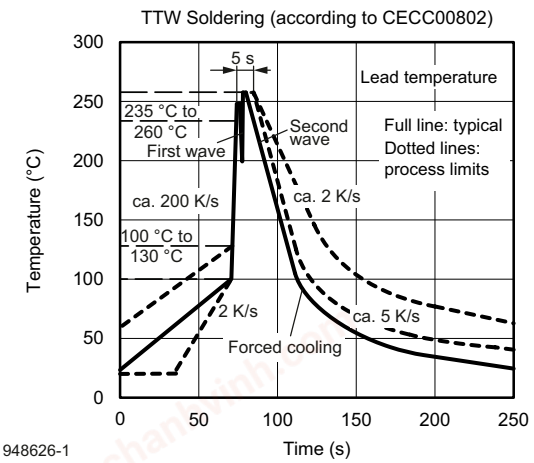


Fig. 9 - Wave Soldering Double Wave Profile
According to J-STD-020 for DIP Devices

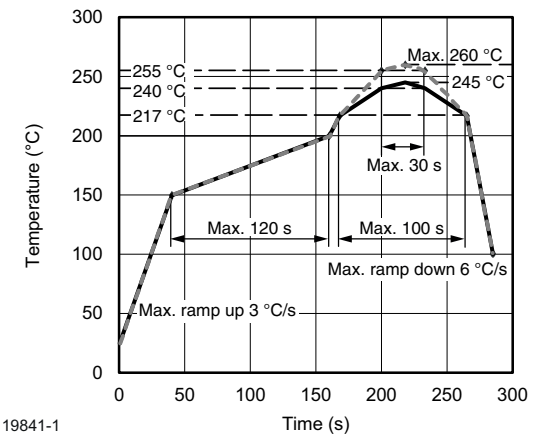


Fig. 10 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: T_{amb} < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

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