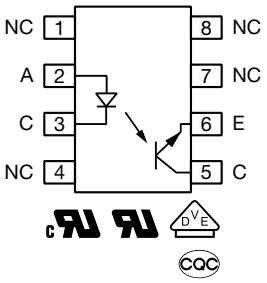
Optocoupler, Phototransistor Output, Low Input Current, High Isolation, Widebody Package



FEATURES

- AEC-Q102 qualified
- High CTR with low input current
- High isolation package
- Creepage ≥ 11 mm
- High collector emitter voltage, V_{CEO} = 80 V
- CTI 600
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

DESCRIPTION

The VOWA617A, VOWA618A series has a GaAlAs infrared emitting diode, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 8-pin high isolating widebody package.

It features a high current transfer ratio at low input current, low coupling capacitance, and high isolation voltage.

Vishay's wide body couplers feature a high level of isolation distance, exhibiting an external creepage distance of ≥ 11 mm. This makes these parts ideal for applications with working voltages exceeding 1000 V, specifically for use in automotive, as well as high reliable industrial applications.

APPLICATIONS

- Galvanic and noise isolation
- Signal transmission
- Hybrid / electric vehicle applications
- Battery management
- System control

AGENCY APPROVALS

- UL1577 (pending)
- cUL (pending)
- DIN EN 60747-5-5 (VDE 0884-5) (pending)
- CQC (pending)

ORDERING INFORMATION

V	O	W	A	6	1	#	A	-	#	X	0	1	8	T
PART NUMBER									CTR BIN	PACKAGE OPTION				TAPE AND REEL

AGENCY CERTIFIED / PACKAGE	CTR (%)			
	5 mA			
UL, cUL, VDE, CQC	**50 to 600**	**100 to 200**	**160 to 320**	**200 to 400**
SMD-8, widebody, 400 mil (option 8)	VOWA617A-X018T	VOWA617A-3X018T	VOWA617A-4X018T	VOWA617A-9X018T
	1 mA			
UL, cUL, VDE, CQC	**50 to 600**	**100 to 200**	**160 to 320**	**200 to 400**
SMD-8, widebody, 400 mil (option 8)	VOWA618A-X018T	VOWA618A-3X018T	VOWA618A-4X018T	VOWA618A-9X018T

Note

- Additional options may be possible, please contact sales office

For technical questions, contact: optocoupleranswers@vishay.com

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Reverse voltage		V_R	5	V
Power dissipation		P_{diss}	80	mW
Forward current		I_F	50	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	1.5	A
Junction temperature		T_j	140	°C
OUTPUT				
Collector emitter voltage		V_{CEO}	80	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	50	mA
Power dissipation		P_{diss}	150	mW
Junction temperature		T_j	140	°C
COUPLER				
Total power dissipation		P_{tot}	200	mW
Storage temperature range		T_{stg}	-40 to +150	°C
Ambient temperature range		T_{amb}	-40 to +125	°C
Soldering temperature	t = 10 s	T_{sld}	260	°C

Note

- 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

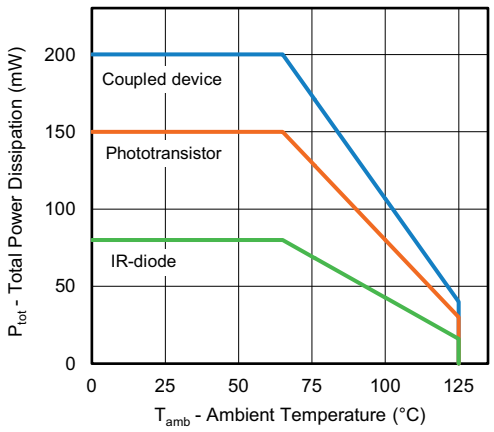


Fig. 1 - Power Dissipation vs. Ambient Temperature

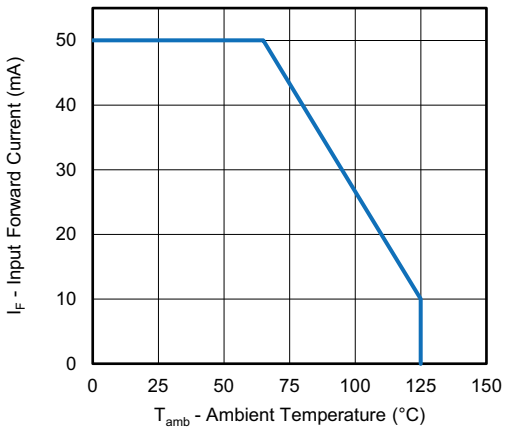


Fig. 2 - Maximum Forward Current vs. Ambient Temperature

RECOMMENDED OPERATING CONDITIONS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**SYMBOL**	**MIN.**	**MAX.**	**UNIT**
Forward current	I_F	0.5	20	mA

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 5 mA	V_F	-	1.34	1.5	V
Reverse current	V_R = 5 V	I_R	-	-	10	µA
Capacitance	V_R = 0 V, f = 1 MHz	C_I	-	30	-	pF
OUTPUT						
Collector emitter leakage current	V_{CE} = 10 V	I_{CEO}	-	10	100	nA
	V_{CE} = 10 V, I_F = 0 A, T_{amb} = 100 °C	I_{CEO}	-	3	50	µA
Collector emitter breakdown voltage	I_C = 100 µA	BV_{CEO}	80	-	-	V
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz	C_{CE}	-	4	-	pF
COUPLER						
Collector emitter saturation voltage	I_F = 5 mA, I_C = 1 mA	V_{CEsat}	-	0.1	0.4	V
Cut-off frequency	I_F = 10 mA, V_{CC} = 5 V, R_L = 100 Ω	f_{CTR}	-	241	-	kHz
Coupling capacitance	f = 1 MHz	C_{IO}	-	0.9	-	pF

Note

- 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

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
I_C/I_F	I_F = 5 mA, V_{CE} = 5 V	VOWA617A	CTR	50	-	600	%
		VOWA617A-3	CTR	100	-	200	%
		VOWA617A-4	CTR	160	-	320	%
		VOWA617A-9	CTR	200	-	400	%
	I_F = 1 mA, V_{CE} = 5 V	VOWA618A	CTR	50	-	600	%
		VOWA618A-3	CTR	100	-	200	%
		VOWA618A-4	CTR	160	-	320	%
		VOWA618A-9	CTR	200	-	400	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED						
Rise time	I_C = 2 mA, V_{CC} = 5 V, R_L = 100 Ω	t_r	-	2.6	-	µs
Fall time		t_f	-	3.9	-	µs
Turn-on time		t_{on}	-	4.0	-	µs
Turn-off time		t_{off}	-	4.4	-	µs
SATURATED						
Rise time	I_F = 5 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_r	-	1.5	-	µs
Fall time		t_f	-	11.3	-	µs
Turn-on time		t_{on}	-	2.0	-	µs
Turn-off time		t_{off}	-	17.1	-	µs

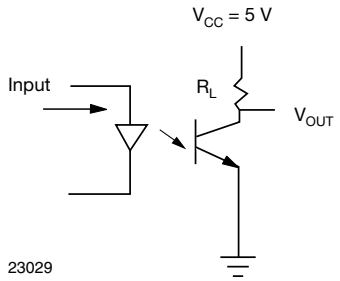


Fig. 3 - Test Circuit for Switching Characteristics

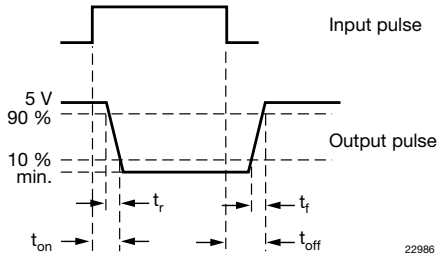


Fig. 4 - Parameter and Limit Definition

SAFETY AND INSULATION RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Climatic classification	According to IEC 68 part 1		40 / 125 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group I	CTI	600	
Maximum rated withstanding isolation voltage	According to UL1577, t = 1 min	V_{ISO}	5300	V_{RMS}
Maximum transient isolation voltage	According to DIN EN 60747-5-5	V_{IOTM}	8000	V_{peak}
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	V_{IORM}	1500	V_{peak}
Maximum working isolation voltage	According to DIN EN 60747-5-5	V_{IOWM}	1060	V_{RMS}
Isolation resistance	T_{amb} = 25 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{12}	Ω
	T_{amb} = 125 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{11}	Ω
Output safety power		P_{SO}	800	mW
Input safety current		I_{SI}	350	mA
Input safety temperature		T_S	175	°C
Creepage distance	SMD-8, widebody, 400 mil (option 8)		≥ 11	mm
Clearance distance			≥ 11	mm
Input to output test voltage, method B	V_{IORM} x 1.875 = V_{PR}, 100 % production test with t_M = 1 s, partial discharge < 5 pC	V_{PR}	2813	V_{peak}
Input to output test voltage, method A	V_{IORM} x 1.6 = V_{PR}, 100 % sample test with t_M = 10 s, partial discharge < 5 pC	V_{PR}	2400	V_{peak}

Note

- As per IEC 60747-5-5, 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)

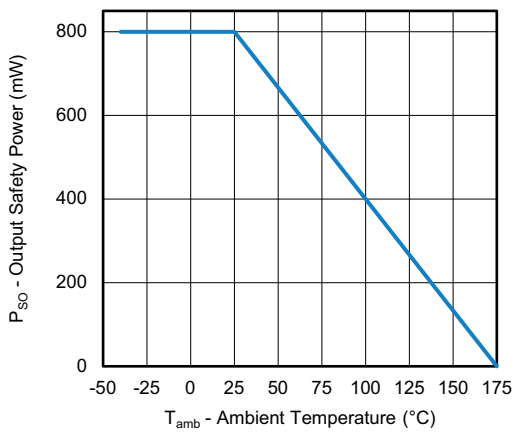


Fig. 5 - Output Safety Power vs. Ambient Temperature

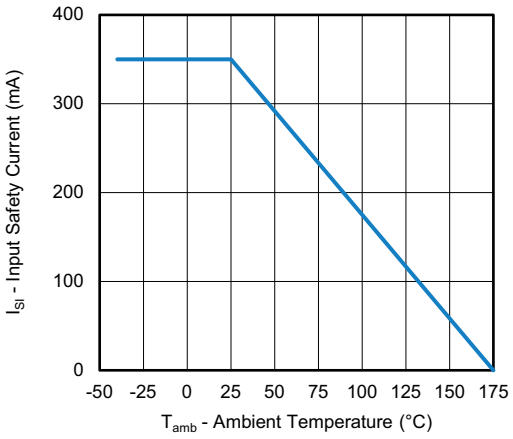


Fig. 6 - Input Safety Current vs. Ambient Temperature

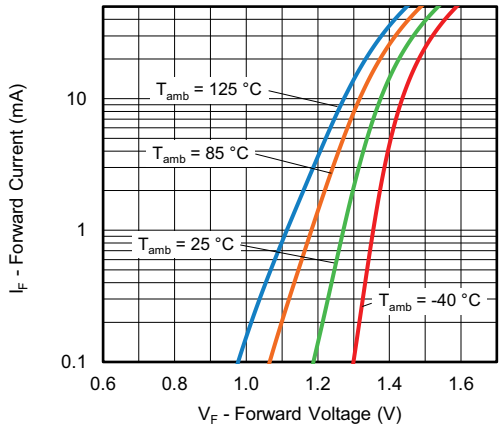


Fig. 7 - Forward Current vs. Forward Voltage

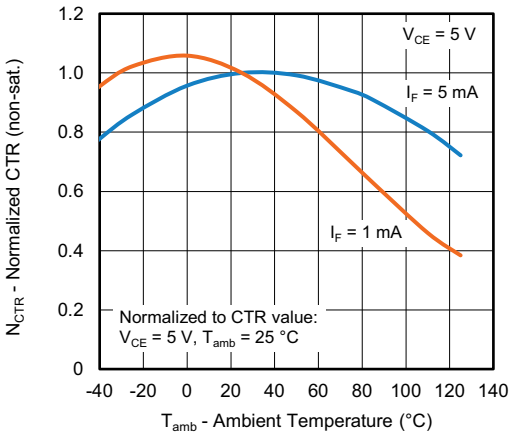


Fig. 10 - Normalized CTR (non-saturated) vs. Ambient Temperature

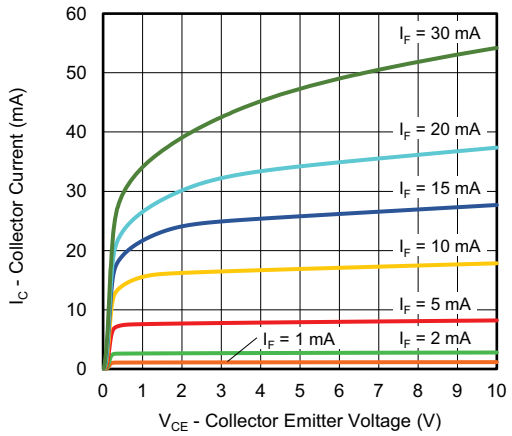


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-saturated)

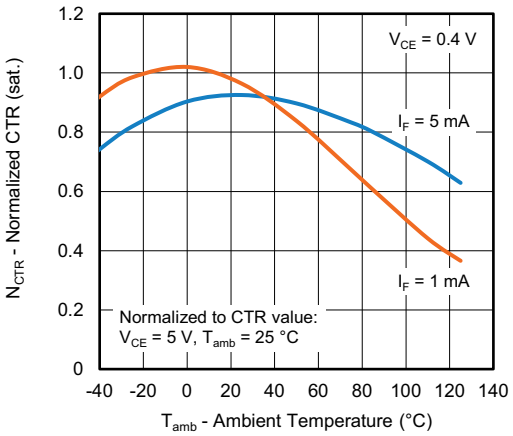


Fig. 11 - Normalized CTR (saturated) vs. Ambient Temperature

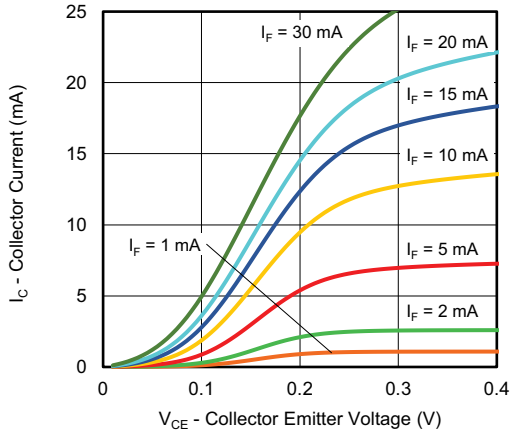


Fig. 9 - Collector Current vs. Collector Emitter Voltage (saturated)

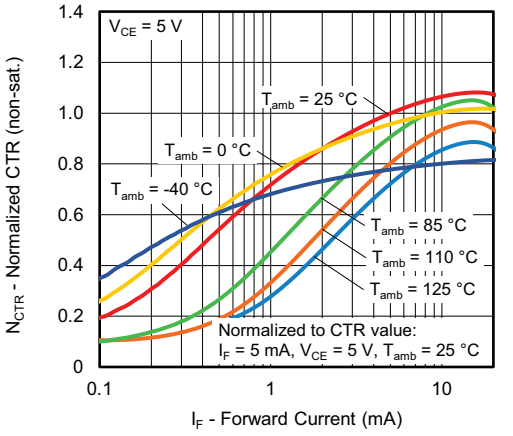


Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current

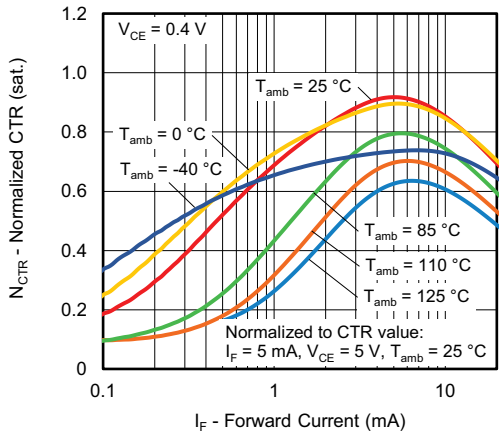


Fig. 13 - Normalized CTR (saturated) vs. Forward Current

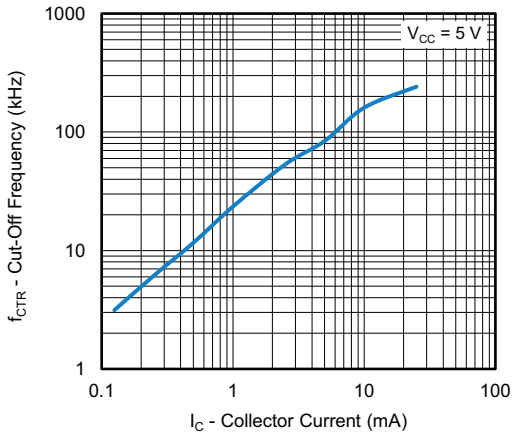


Fig. 16 - Cut-Off Frequency vs. Collector Current

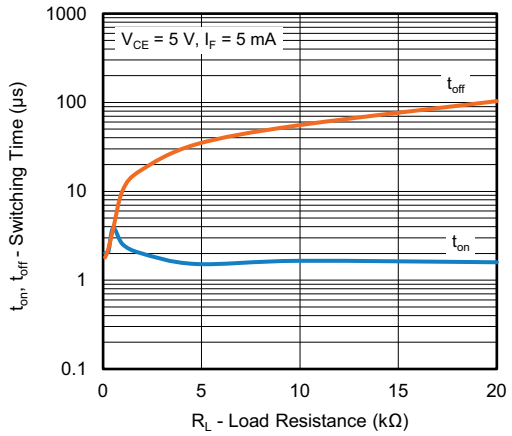


Fig. 14 - Switching Time vs. Load Resistance

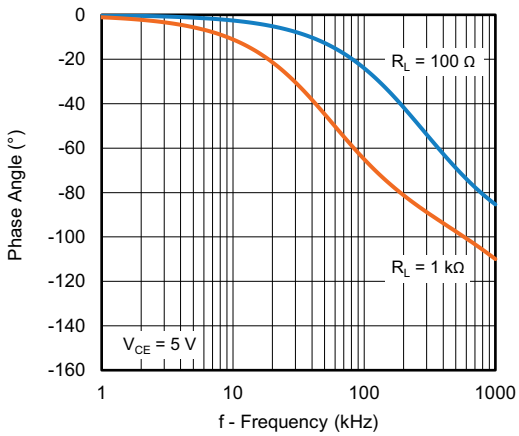


Fig. 17 - Phase Angle vs. Frequency

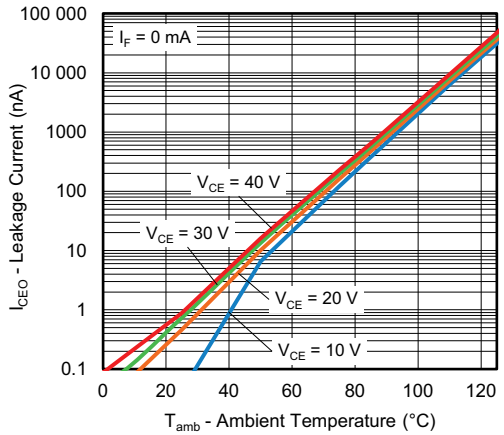
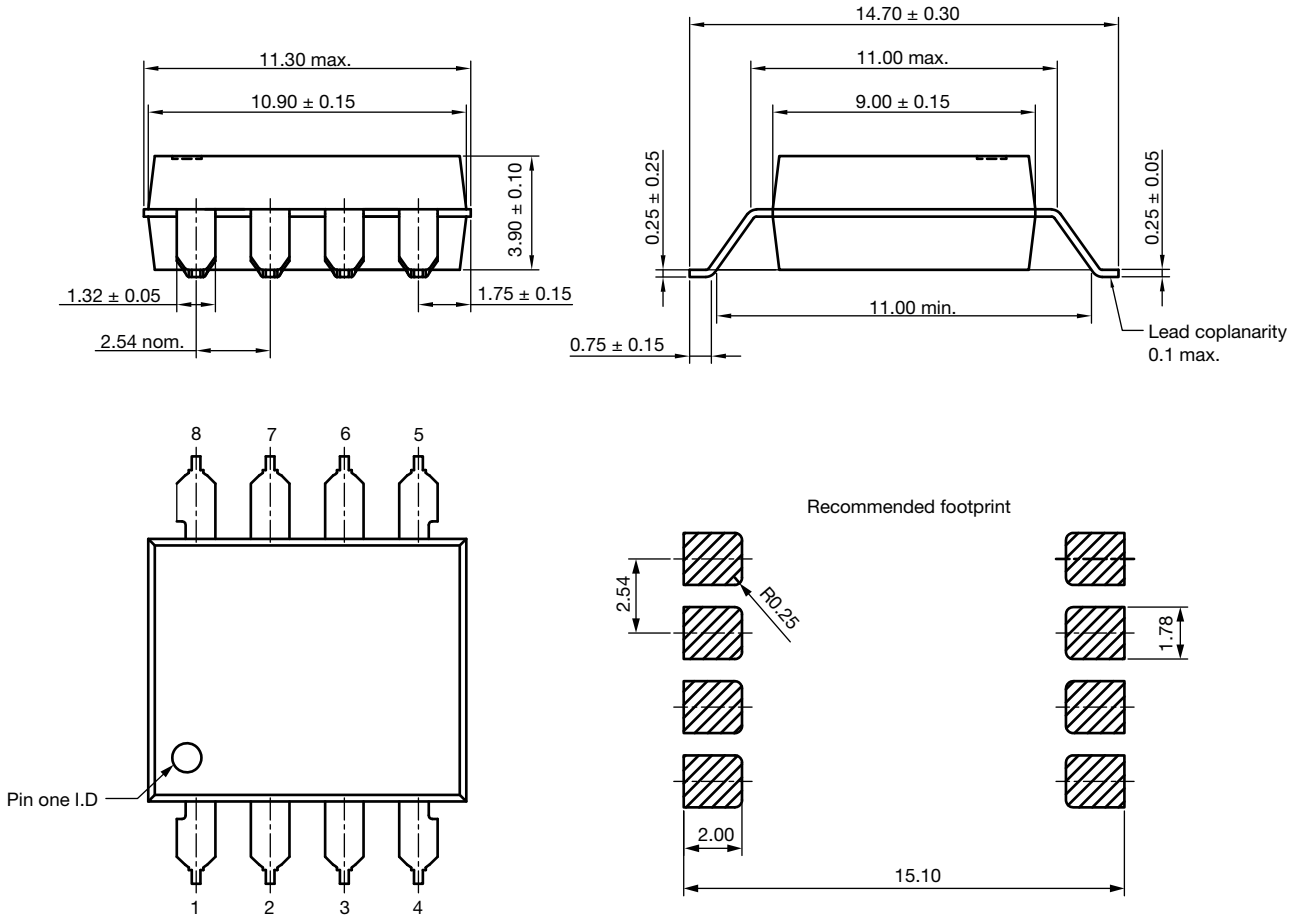


Fig. 15 - Leakage Current vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)



SOLDER PROFILES

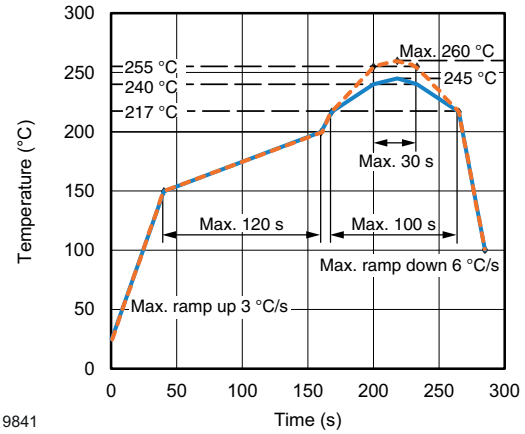


Fig. 18 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: 168 h

Conditions: T_{amb} < 30 °C, RH ≤ 60 %

Moisture sensitivity level 3, according to J-STD-020

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