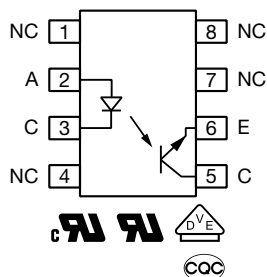




Optocoupler, Phototransistor Output, Low Input Current, High Isolation, Widebody Package



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.

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



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

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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
AGENCY CERTIFIED / PACKAGE	1 mA			
	50 to 600			
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



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, 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	$t_p \leq 10\text{ }\mu\text{s}$	I_{FSM}	1.5	A
Junction temperature		T_j	140	$^{\circ}\text{C}$
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	$^{\circ}\text{C}$
COUPLER				
Total power dissipation		P_{tot}	200	mW
Storage temperature range		T_{stg}	-40 to +150	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	-40 to +125	$^{\circ}\text{C}$
Soldering temperature	$t = 10\text{ s}$	T_{sld}	260	$^{\circ}\text{C}$

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

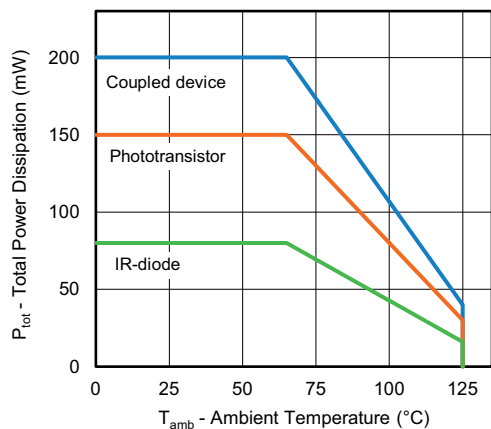


Fig. 1 - Power Dissipation vs. Ambient Temperature

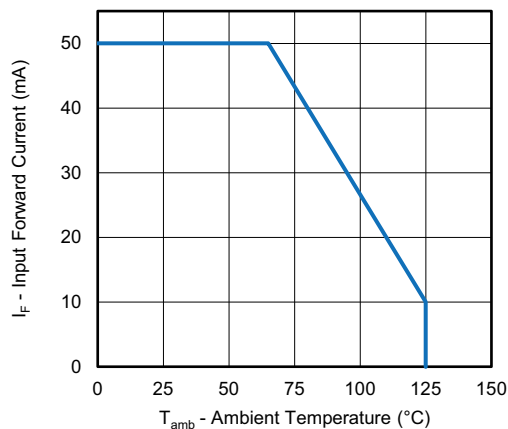


Fig. 2 - Maximum Forward Current vs. Ambient Temperature

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



ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 5\text{ mA}$	V_F	-	1.34	1.5	V
Reverse current	$V_R = 5\text{ V}$	I_R	-	-	10	μA
Capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$	C_I	-	30	-	pF
OUTPUT						
Collector emitter leakage current	$V_{CE} = 10\text{ V}$	I_{CEO}	-	10	100	nA
	$V_{CE} = 10\text{ V}$, $I_F = 0\text{ A}$, $T_{amb} = 100\text{ }^{\circ}\text{C}$	I_{CEO}	-	3	50	μA
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	BV_{CEO}	80	-	-	V
Collector emitter capacitance	$V_{CE} = 5\text{ V}$, $f = 1\text{ MHz}$	C_{CE}	-	4	-	pF
COUPLER						
Collector emitter saturation voltage	$I_F = 5\text{ mA}$, $I_C = 1\text{ mA}$	V_{CEsat}	-	0.1	0.4	V
Cut-off frequency	$I_F = 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$	f_{CTR}	-	241	-	kHz
Coupling capacitance	$f = 1\text{ MHz}$	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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$	VOWA617A	CTR	50	-	600	%
		VOWA617A-3	CTR	100	-	200	%
		VOWA617A-4	CTR	160	-	320	%
		VOWA617A-9	CTR	200	-	400	%
	$I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$	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

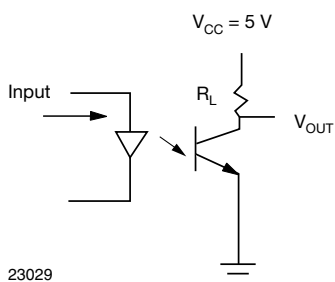


Fig. 3 - Test Circuit for Switching Characteristics

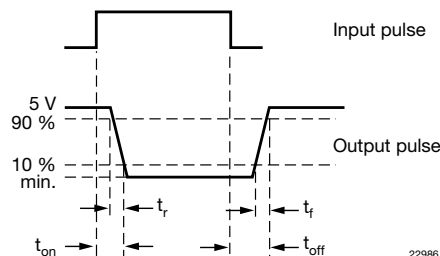


Fig. 4 - Parameter and Limit Definition

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} × 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} × 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.

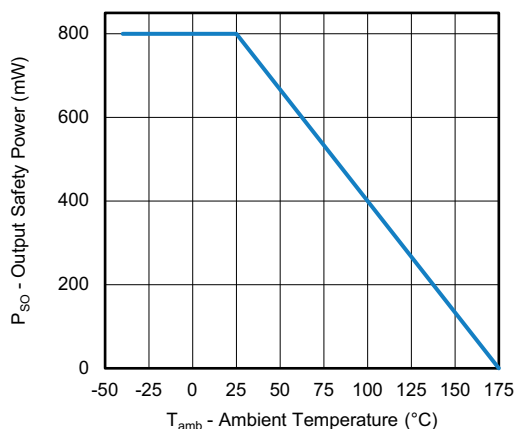
TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)


Fig. 5 - Output Safety Power vs. Ambient Temperature

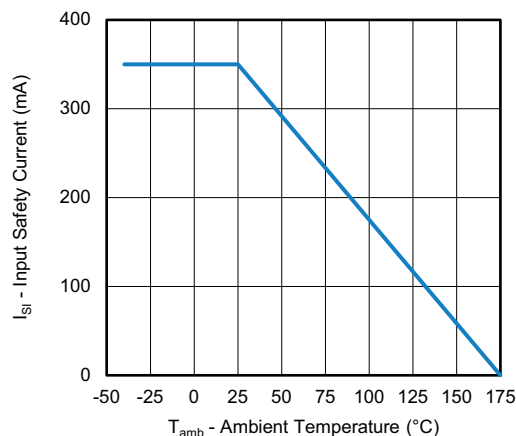


Fig. 6 - Input Safety Current vs. Ambient Temperature

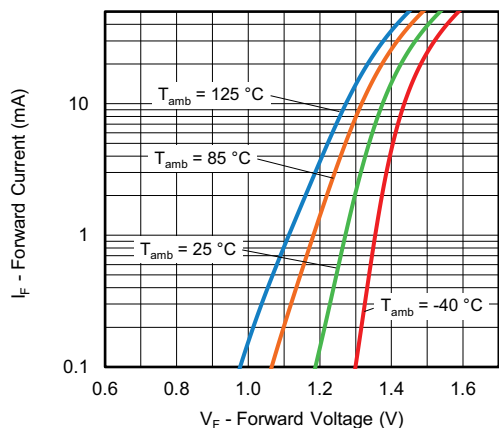


Fig. 7 - Forward Current vs. Forward Voltage

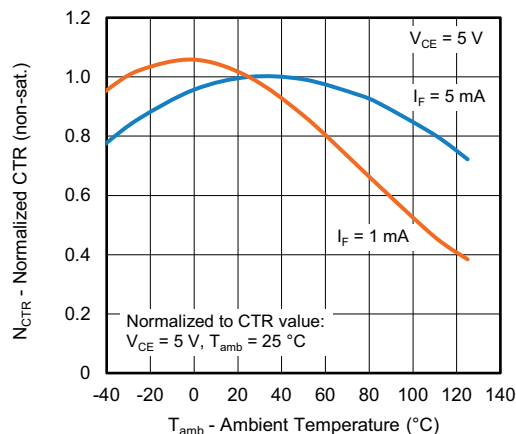


Fig. 10 - Normalized CTR (non-saturated) vs. Ambient Temperature

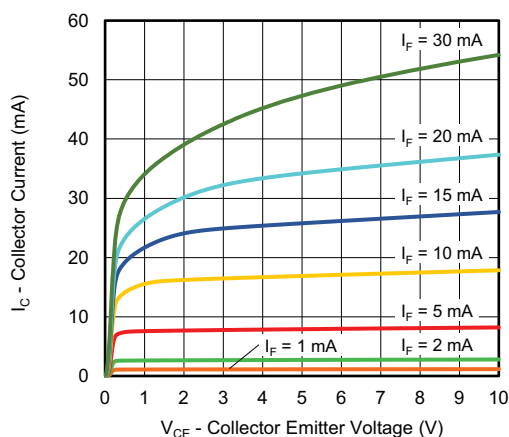


Fig. 8 - Collector Current vs. Collector Emitter Voltage (non-saturated)

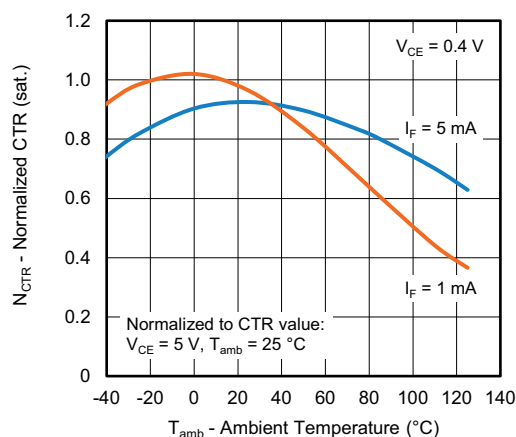


Fig. 11 - Normalized CTR (saturated) vs. Ambient Temperature

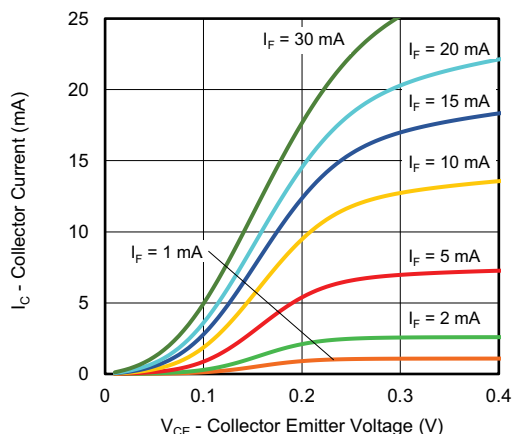


Fig. 9 - Collector Current vs. Collector Emitter Voltage (saturated)

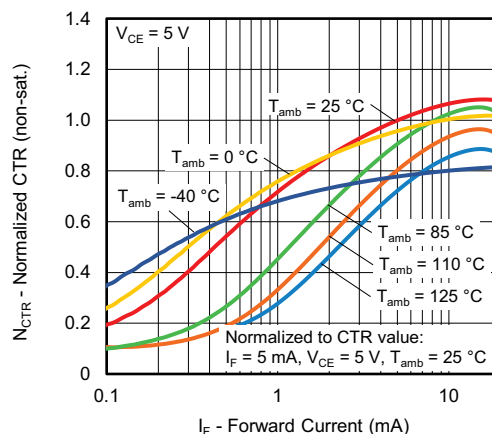


Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current

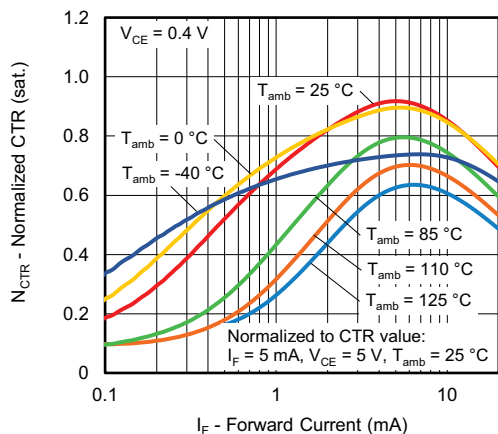


Fig. 13 - Normalized CTR (saturated) vs. Forward Current

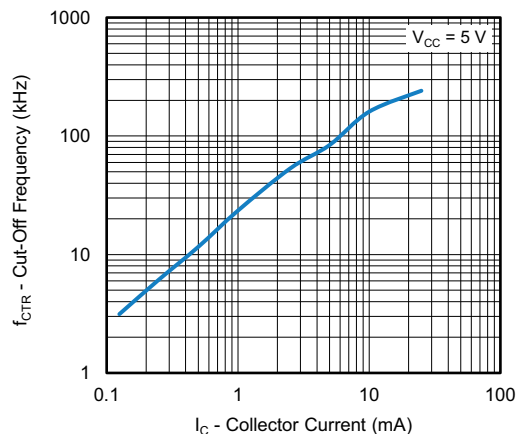


Fig. 16 - Cut-Off Frequency vs. Collector Current

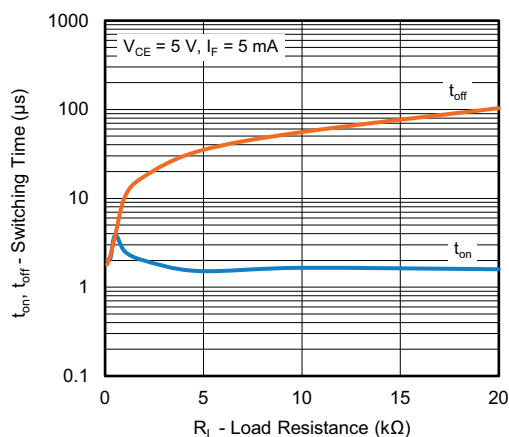


Fig. 14 - Switching Time vs. Load Resistance

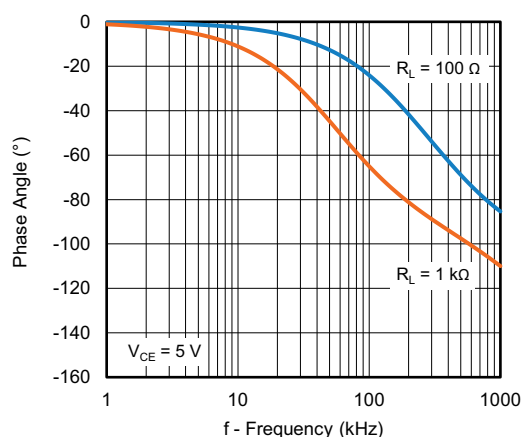


Fig. 17 - Phase Angle vs. Frequency

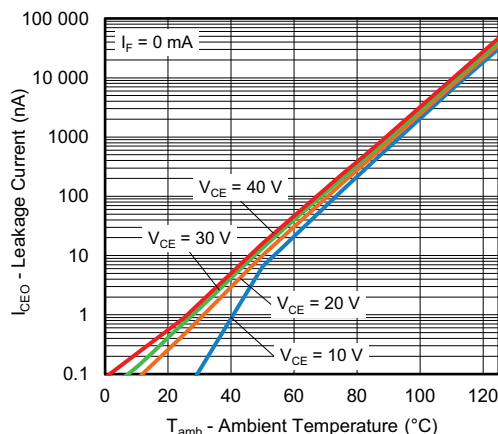
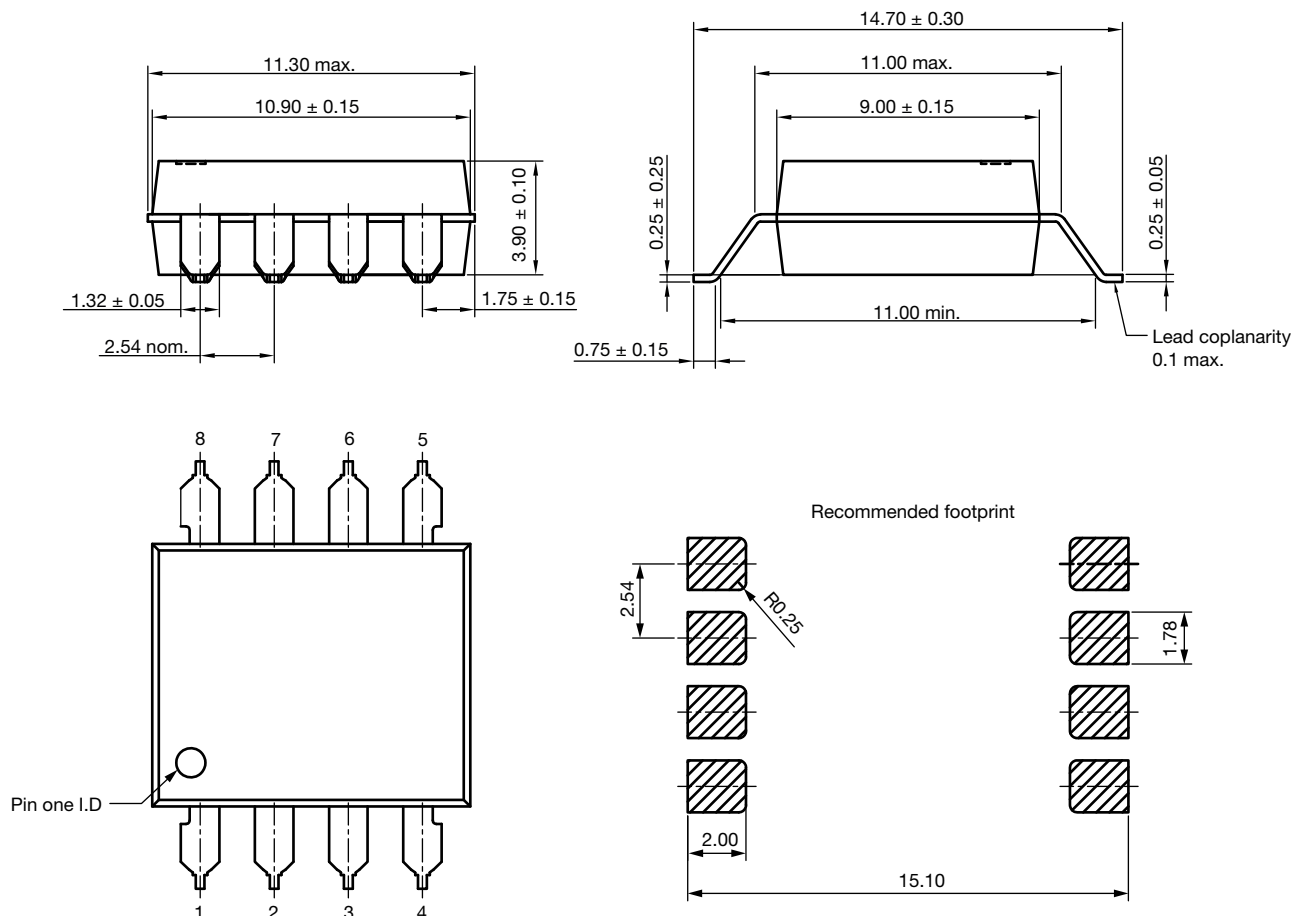


Fig. 15 - Leakage Current vs. Ambient Temperature



PACKAGE DIMENSIONS (in millimeters)



SOLDER PROFILES

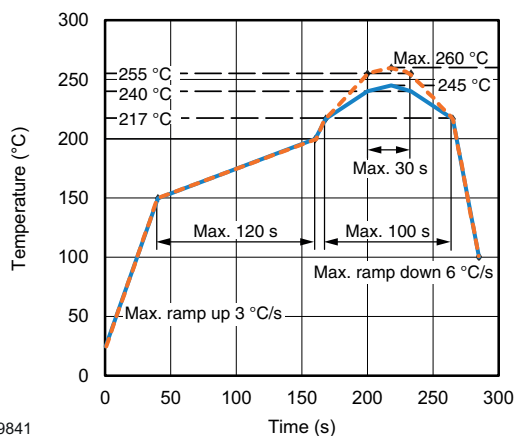


Fig. 18 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: 168 h

Conditions: $T_{\text{amb}} < 30^\circ\text{C}$, $\text{RH} \leq 60\%$

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



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