STEALTH™ Diode
30 A, 600 V

ISL9R3060G2, ISL9R3060P2

Description

The ISL9R3060G2, ISL9R3060P2 is a STEALTH™ diode optimized for low loss performance in high frequency hard switched applications. The STEALTH family exhibits low reverse recovery current (I_{rr}) and exceptionally soft recovery under typical operating conditions. This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low I_{rr} and short ta phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the STEALTH diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

Features

- Stealth Recovery, t_{rr} = 36 ns (@ I_F = 30 A)
- Max Forward Voltage, V_F = 2.4 V (@ T_C = 25°C)
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- This Device is Pb−Free and is RoHS Compliant

Applications

- SMPS
- Hard Switched PFC Boost Diode
- UPS Free Wheeling Diode
- Motor Drive FWD
- SMPS FWD
- Snubber Diode

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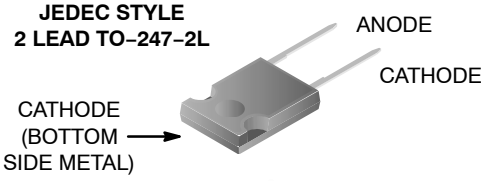
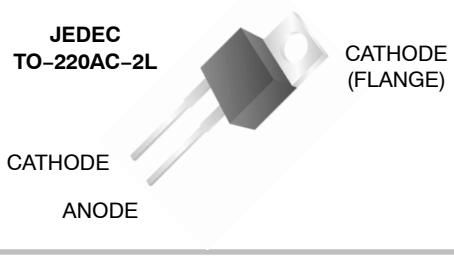
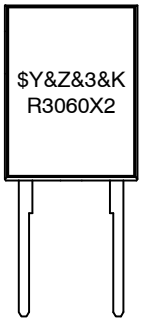
JEDEC STYLE
2 LEAD TO−247−2L



JEDEC
TO−220AC−2L



MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
R3060X2	= Specific Device Code
X	=G/P

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

DEVICE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current	$I_{F(AV)}$	30	A
Repetitive Peak Surge Current (20 kHz Square Wave)	I_{FRM}	70	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)	I_{FSM}	325	A
Power Dissipation	P_D	200	W
Avalanche Energy (1 A, 40 mH)	E_{AVL}	20	mJ
Operating and Storage Temperature Range	T_J, T_{STG}	−55 to 175	°C
Maximum Temperature for Soldering Leads at 0.063 in (1.6 mm) from Case for 10 s	T_L	300	°C
Maximum Temperature for Soldering Package Body for 10 s	T_{PKG}	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Methode	Reel Size	Tape Width	Quantity
R3060G2	ISL9R3060G2	TO−247−2L	Tube	N/A	N/A	30
R3060G2	ISL9R3060P2	TO−220AC−2L	Tube	N/A	N/A	50

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
OFF STATE CHARACTERISTICS							
I_R	Instantaneous Reverse Current	V_R = 600 V	T_C = 25°C	–	–	100	μA
			T_C = 125°C	–	–	1	mA
ON CHARACTERISTICS							
V_F	Instantaneous Forward Voltage	I_F = 30 A	T_C = 25°C	–	2.1	2.4	V
			T_C = 125°C	–	1.7	2.1	V
DYNAMIC CHARACTERISTICS							
C_J	Junction Capacitance	V_R = 10 V, I_F = 0 A		–	120	–	pF
SWITCHING CHARACTERISTICS							
T_{rr}	Reverse Recovery Time	I_F = 1 A, di_F/dt = 100 A/μs, V_R = 30 V		–	27	35	ns
		I_F = 30 A, di_F/dt = 100 A/μs, V_R = 30V		–	36	45	ns
T_{rr}	Reverse Recovery Time	I_F = 30 A di_F/dt = 200 A/μs V_R = 390 V T_C = 25°C		–	36	–	ns
I_{RR}	Reverse Recovery Current			–	2.9	–	A
Q_{RR}	Reverse Recovery Charge			–	55	–	nC
T_{rr}	Reverse Recovery Time	I_F = 30 A di_F/dt = 200 A/μs V_R = 390 V, T_C = 125°C		–	110	–	ns
S	Softness Factor (t_b/t_a)			–	1.9	–	–
I_{RR}	Reverse Recovery Current			–	6	–	A
Q_{RR}	Reverse Recovery Charge			–	450	–	nC

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted) (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
SWITCHING CHARACTERISTICS						
T_{rr}	Reverse Recovery Time	I_F = 30 A dI_F/dt = 1000 A/μs V_R = 390 V T_C = 125°C	–	60	–	ns
S	Softness Factor (t_b/t_a)		–	1.25	–	–
I_{RR}	Reverse Recovery Current		–	21	–	A
Q_{RR}	Reverse Recovery Charge		–	730	–	nC
dI_M/dt	Maximum di/dt during t_b		–	800	–	A/μs
THERMAL CHARACTERISTICS						
$R_{\theta JC}$	Thermal Resistance Junction to Case		–	–	0.75	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO−247	–	–	30	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO−220	–	–	62	°C/W

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CURVES

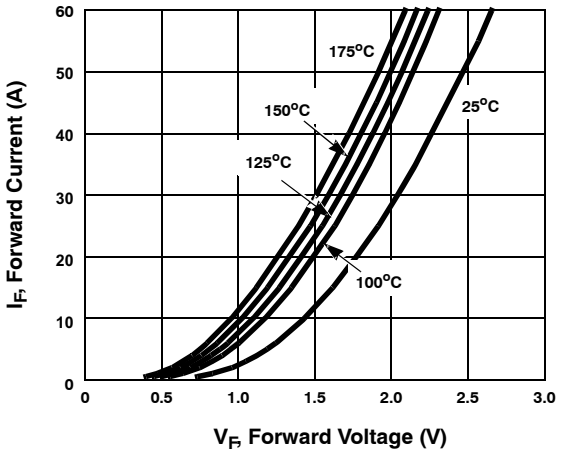


Figure 1. Forward Current vs. Forward Voltage

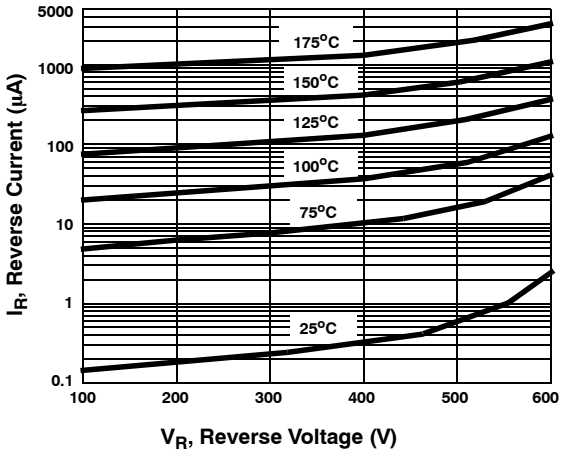


Figure 2. Reverse Current vs. Reverse Voltage

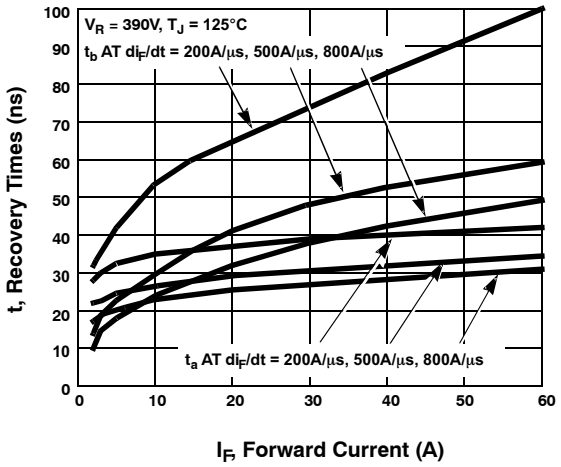


Figure 3. t_a and t_b Curves vs. Forward Current

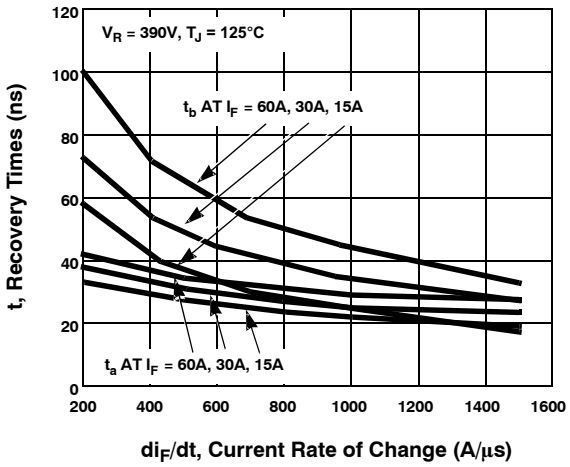


Figure 4. t_a and t_b Curves vs. di_F/dt

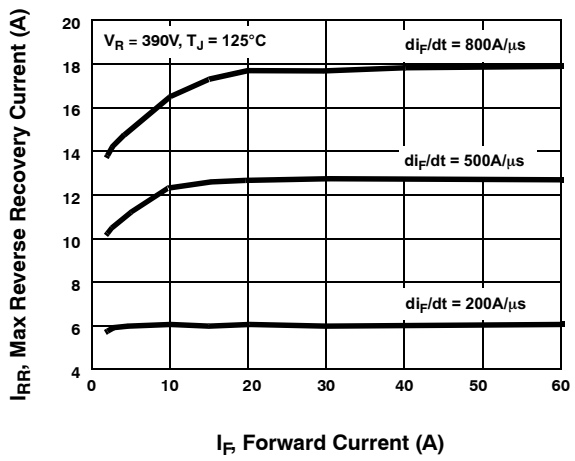


Figure 5. Maximum Reverse Recovery Current vs. Forward Current

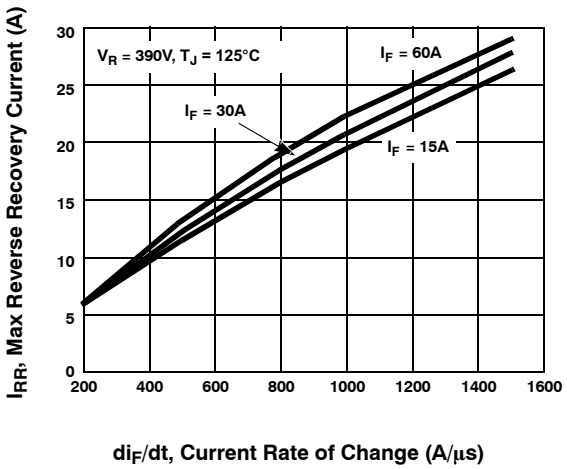


Figure 6. Maximum Reverse Recovery Current vs. di_F/dt

TYPICAL PERFORMANCE CURVES

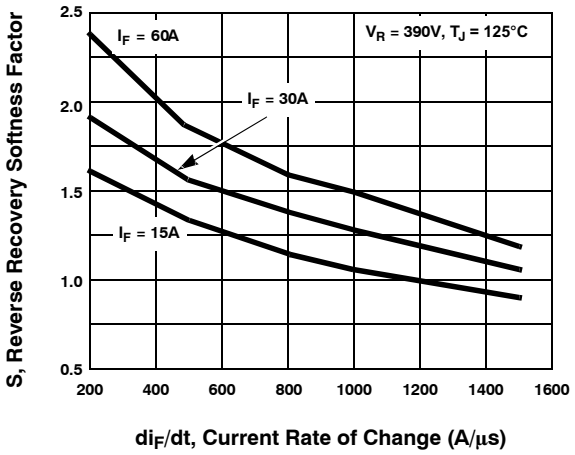


Figure 7. Reverse Recovery Softness Factor vs. di_F/dt

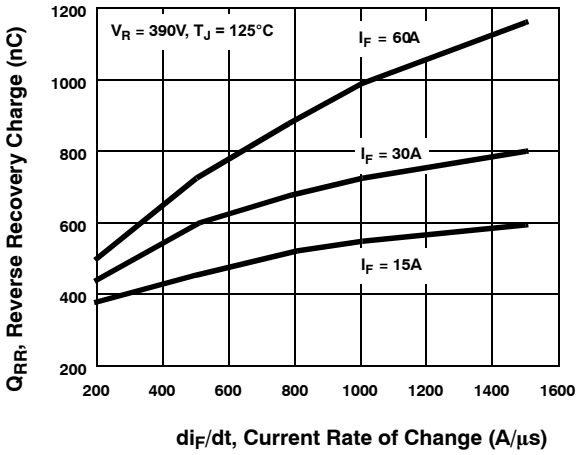


Figure 8. Reverse Recovery Charge vs. di_F/dt

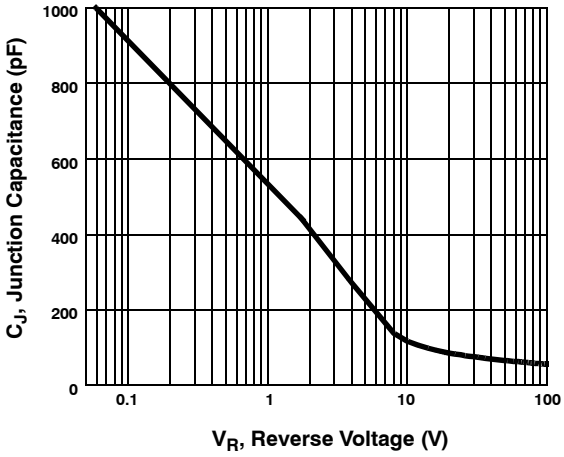


Figure 9. Junction Capacitance vs. Reverse Voltage

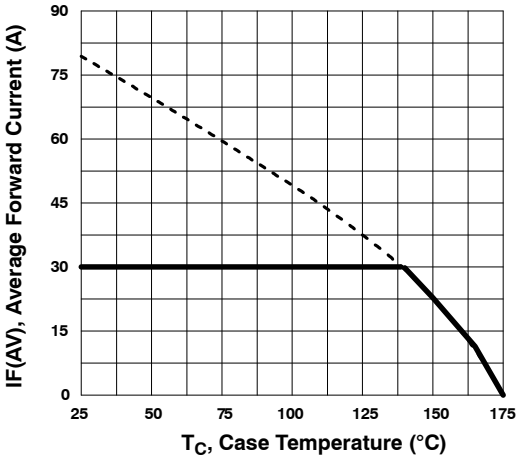


Figure 10. Forward Current Derating Curve

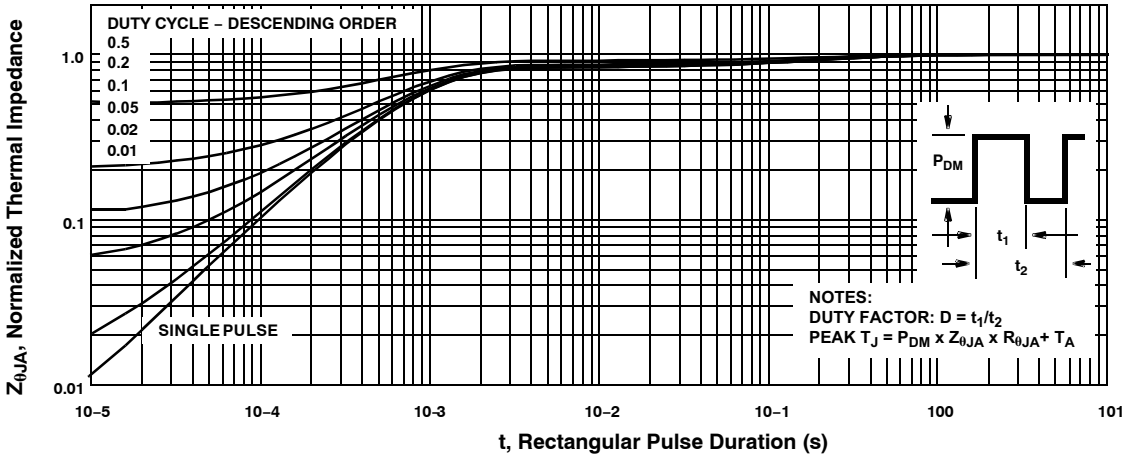


Figure 11. Normalized Maximum Transient Thermal Impedance

TEST CIRCUITS AND WAVEFORMS

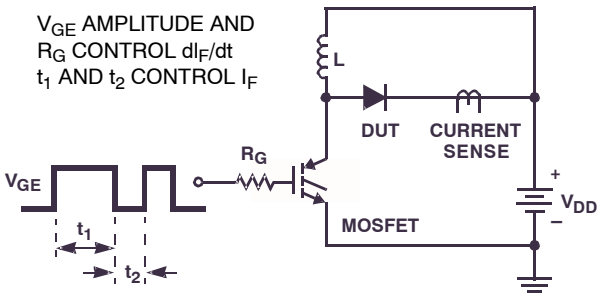


Figure 12. T_{rr} Test Circuit

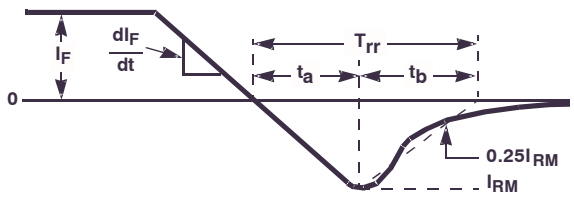


Figure 13. T_{rr} Waveforms and Definitions

I = 1 A
L = 40 mH
R < 0.1 Ω
V_{DD} = 50 V
$E_{AVL} = 1/2LI2\ [V_{R(AVL)}/(V_{R(AVL)}–V_{DD})]$
Q1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)

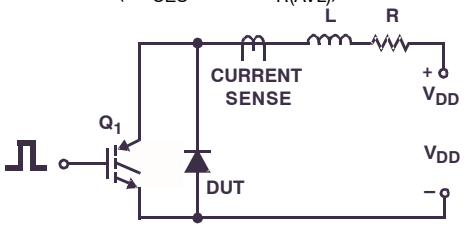


Figure 14. Avalanche Energy Test Circuit

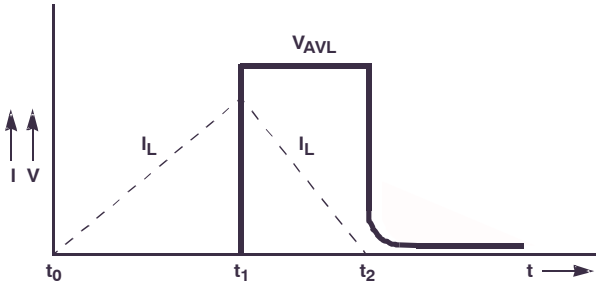


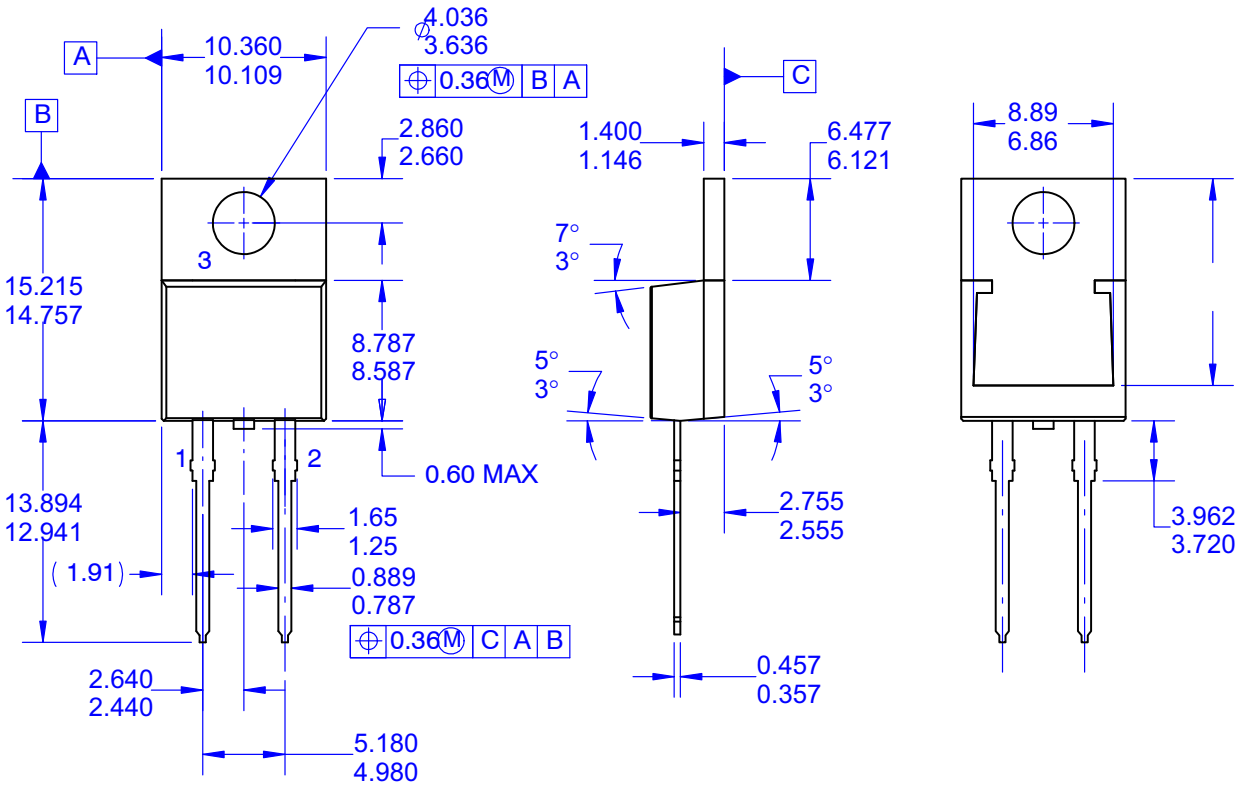
Figure 15. Avalanche Current and Voltage Waveforms

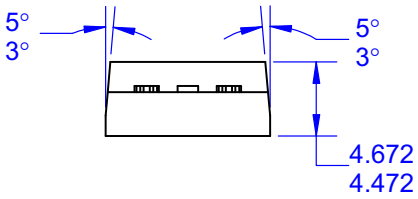
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

TO−220−2LD
CASE 340BA
ISSUE O

DATE 31 AUG 2016





NOTES:
A. PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSION AND TOLERANCE AS PER ASME Y14.5−2009.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.

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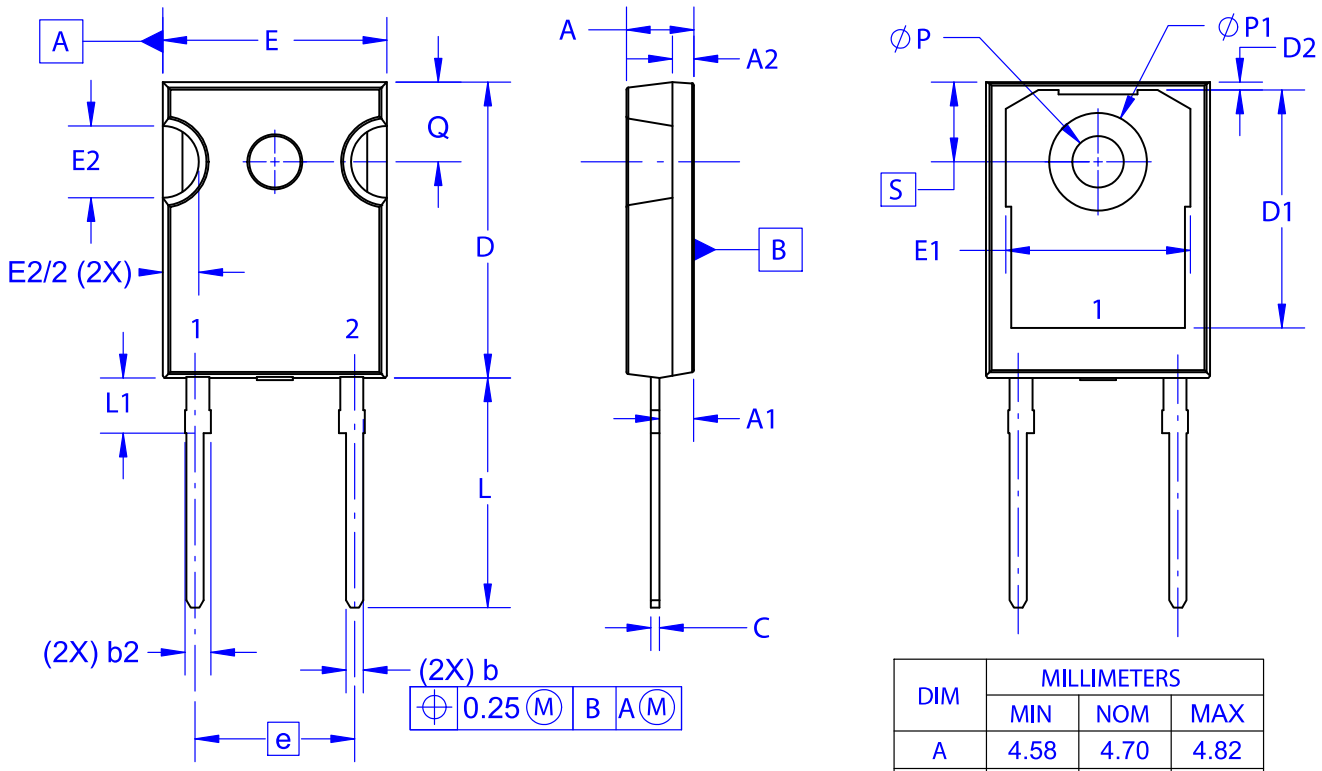
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

TO−247−2LD
CASE 340CL
ISSUE A

DATE 03 DEC 2019

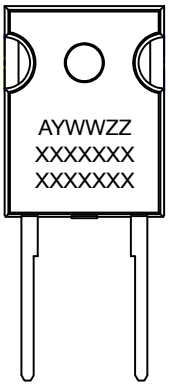


NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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