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FAIRCHILD SEMICONDUCTOR®

February 2014

ISL9R18120G2, ISL9R18120P2, ISL9R18120S3S

18 A, 1200 V, STEALTH™ Diode

Features

- Stealth Recovery t_{rr} = 300 ns (@ I_F = 18 A)
- Max Forward Voltage, V_F = 3.3 V (@ T_C = 25°C)
- 1200 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

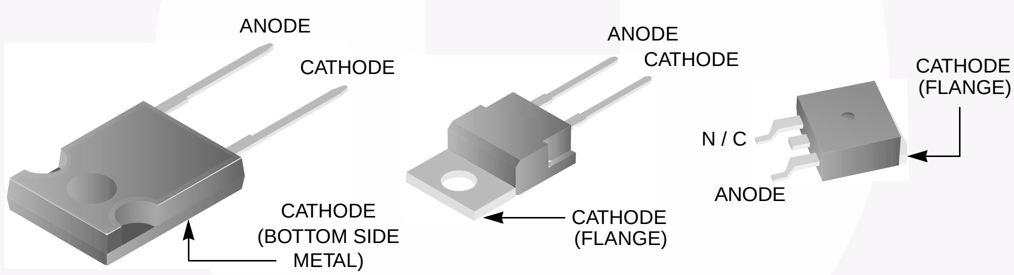
Applications

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

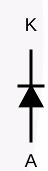
Description

The ISL9R18120G2, ISL9R18120P2, ISL9R18120S3S 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.

Package



Symbol



Device Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
V_{RWM}	Working Peak Reverse Voltage	1200	V
V_R	DC Blocking Voltage	1200	V
$I_{F(AV)}$	Average Rectified Forward Current (T_C = 92°C)	18	A
I_{FRM}	Repetitive Peak Surge Current (20kHz Square Wave)	36	A
I_{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	200	A
P_D	Power Dissipation	125	W
E_{AVL}	Avalanche Energy (1A, 40mH)	20	mJ
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 175	°C
T_L T_{PKG}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Application Note AN-7528	300 260	°C °C

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Mathod	Tape Width	Quantity
ISL9R18120G2	R18120G2	TO-247	Tube	N/A	30
ISL9R18120P2	R18120P2	TO-220AC	Tube	N/A	50
ISL9R18120S3S	R18120S3	TO-263AB	Reel	24mm	800

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 = 1200 V	T_C = 25°C	-	-	100	μA
			T_C = 125°C	-	-	1.0	mA
On State Characteristics							
V_F	Instantaneous Forward Voltage	I_F = 18 A	T_C = 25°C	-	2.7	3.3	V
			T_C = 125°C	-	2.5	3.1	V
Dynamic Characteristics							
C_J	Junction Capacitance	V_R = 10 V, I_F = 0 A		-	69	-	pF
Switching Characteristics							
t_{rr}	Reverse Recovery Time	I_F = 1 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	38	45	ns
		I_F = 18 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	60	70	ns
t_{rr}	Reverse Recovery Time	I_F = 18 A, dI_F/dt = 200 A/μs, V_R = 780 V, T_C = 25°C		-	300	-	ns
I_{rr}	Reverse Recovery Current			-	6.5	-	A
Q_{rr}	Reverse Recovered Charge			-	950	-	nC
t_{rr}	Reverse Recovery Time	I_F = 18 A, dI_F/dt = 200 A/μs, V_R = 780 V, T_C = 125°C		-	400	-	ns
S	Softness Factor (t_b/t_a)			-	7.0	-	-
I_{rr}	Reverse Recovery Current			-	8.0	-	A
Q_{rr}	Reverse Recovered Charge			-	2.0	-	μC
t_{rr}	Reverse Recovery Time	I_F = 18 A, dI_F/dt = 1000 A/μs, V_R = 780 V, T_C = 125°C		-	235	-	ns
S	Softness Factor (t_b/t_a)			-	5.2	-	-
I_{rr}	Reverse Recovery Current			-	22	-	A
Q_{rr}	Reverse Recovered Charge			-	2.1	-	μC
dI_M/dt	Maximum di/dt during t_b			-	370	-	A/μs
Thermal Characteristics							
$R_{\theta JC}$	Thermal Resistance Junction to Case	TO-247, TO-220, TO-263		-	-	1.0	°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, TO-263		-	-	62	°C/W

Typical Performance Curves

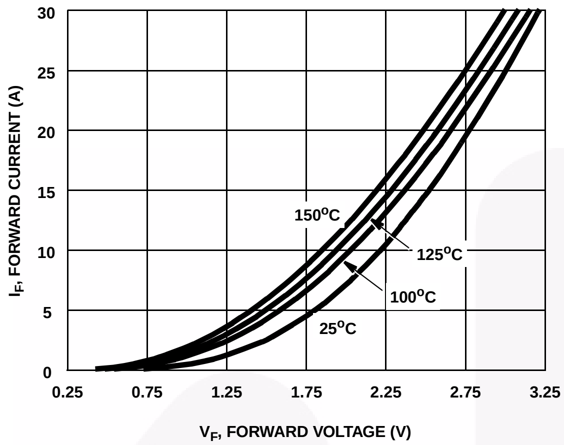


Figure 1. Forward Current vs Forward Voltage

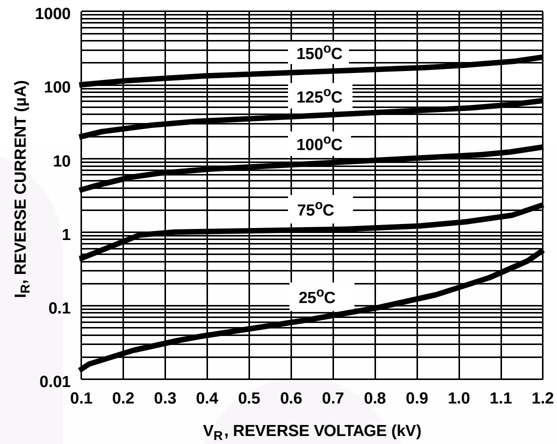


Figure 2. Reverse Current vs Reverse Voltage

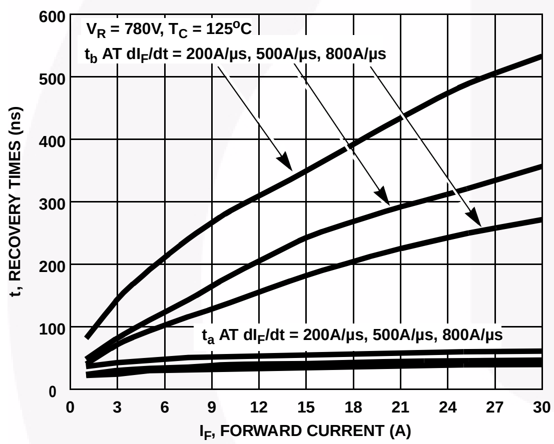


Figure 3. t_a and t_b Curves vs Forward Current

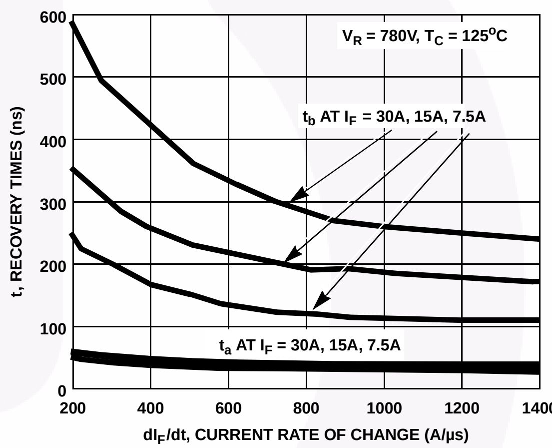


Figure 4. t_a and t_b Curves vs dI_F/dt

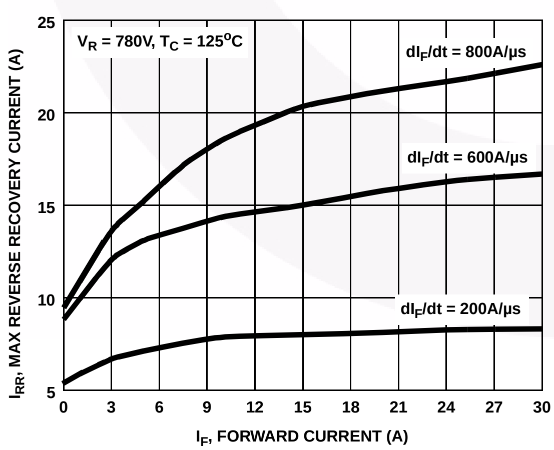


Figure 5. Maximum Reverse Recovery Current vs Forward Current

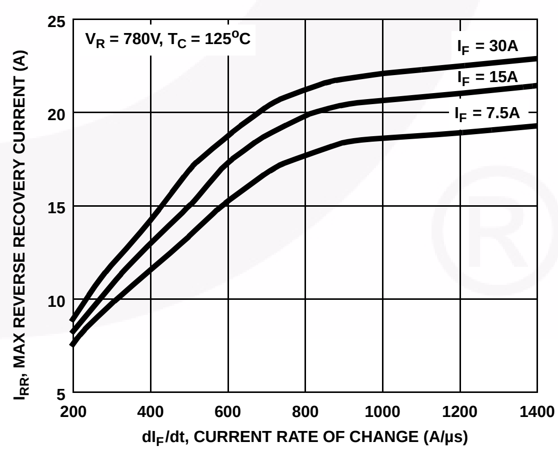


Figure 6. Maximum Reverse Recovery Current vs dI_F/dt

Typical Performance Curves (Continued)

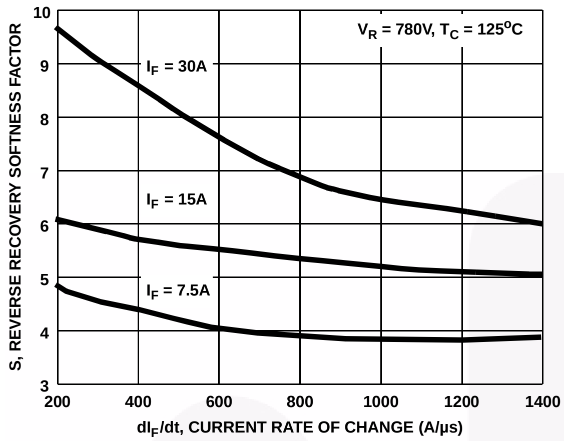


Figure 7. Reverse Recovery Softness Factor vs dI_F/dt

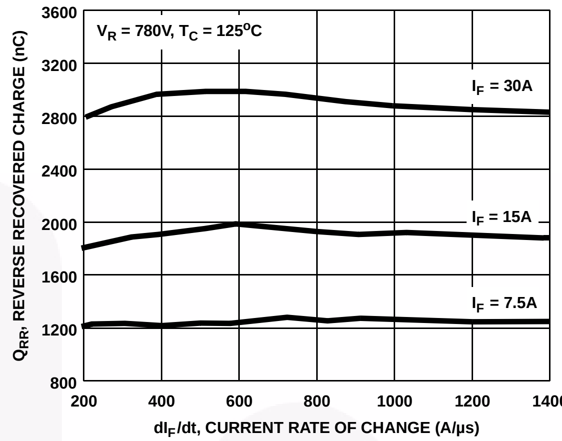


Figure 8. Reverse Recovered Charge vs dI_F/dt

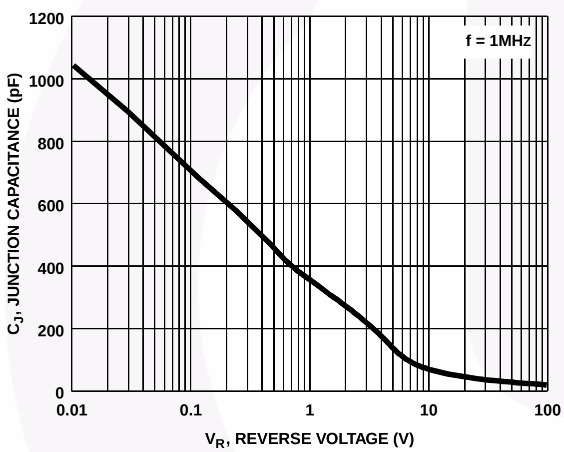


Figure 9. Junction Capacitance vs Reverse Voltage

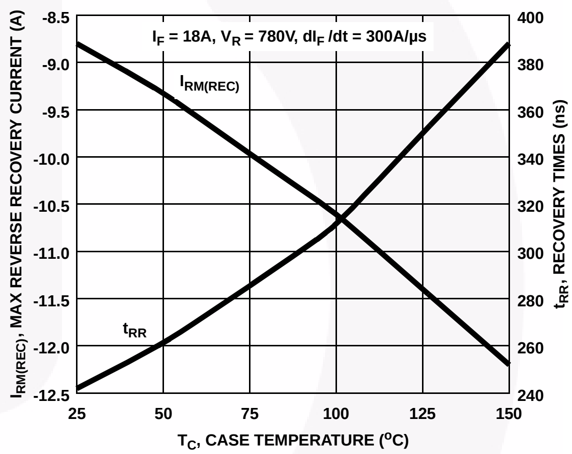


Figure 10. Reverse Recovery Current and Times vs Case Temperature

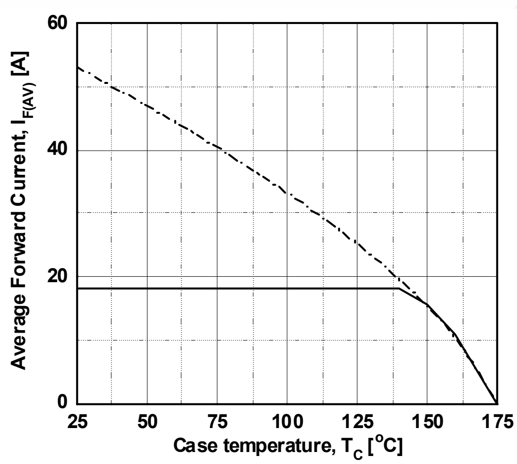


Figure 11. DC Current Derating Curve

Typical Performance Curves (Continued)

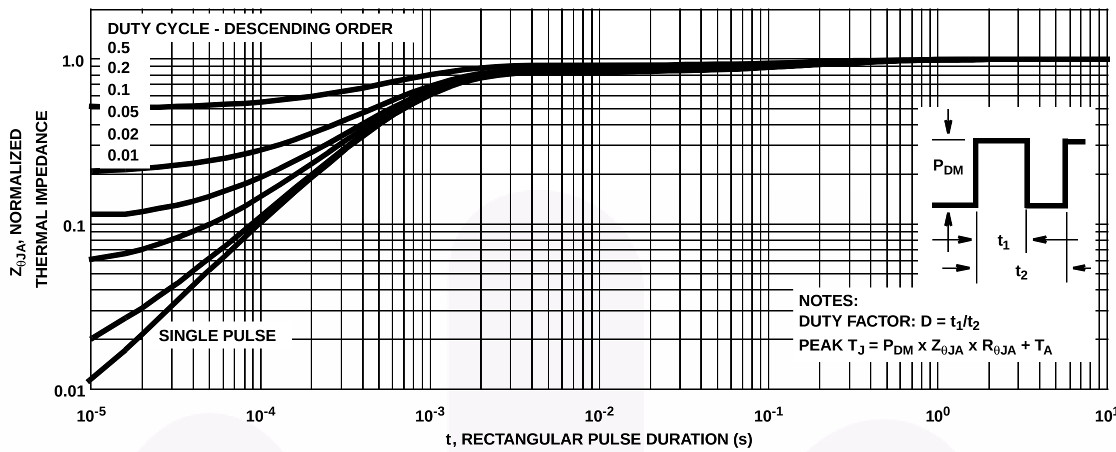


Figure 12. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms

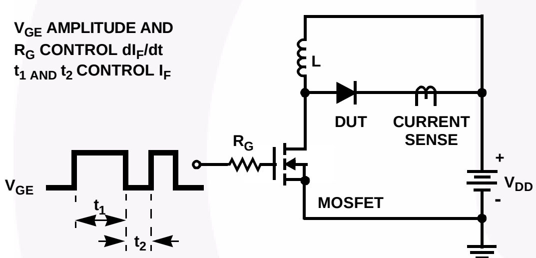


Figure 13. t_{rr} Test Circuit

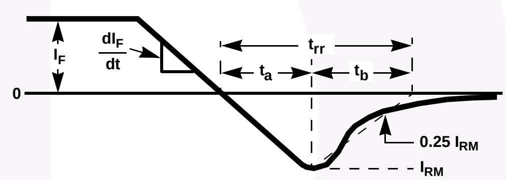


Figure 14. t_{rr} Waveforms and Definitions

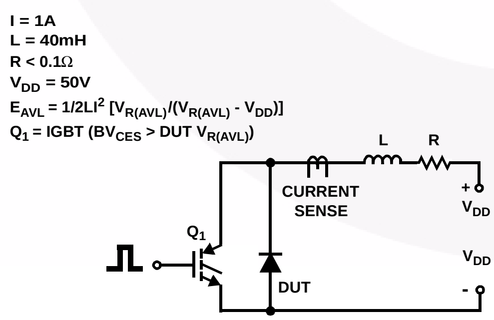


Figure 15. Avalanche Energy Test Circuit

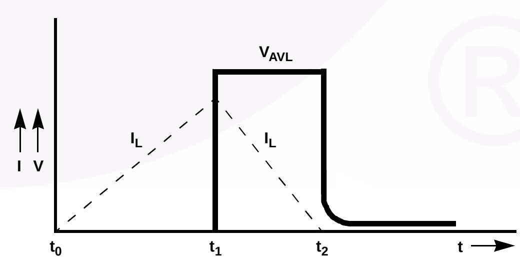


Figure 16. Avalanche Current and Voltage Waveforms

Mechanical Dimensions

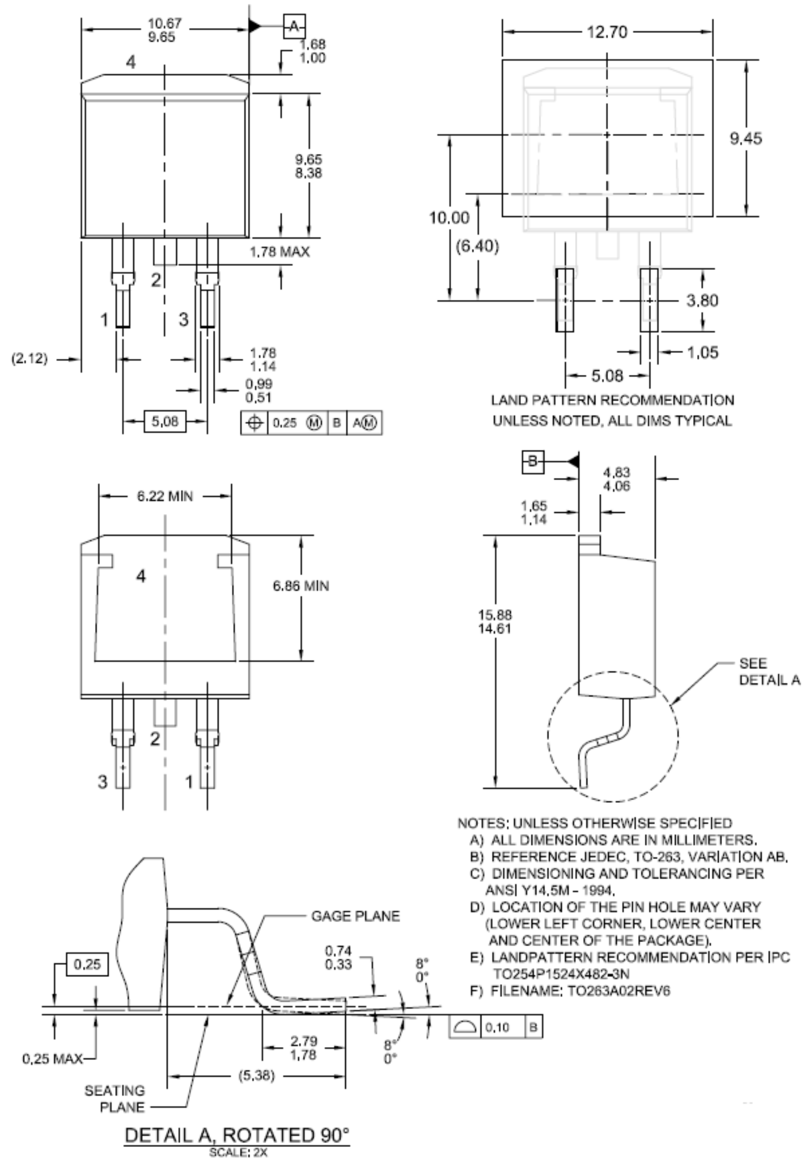


Figure 17. TO-263 2L (D^2-PAK) - 2LD,TO263, SURFACE MOUNT

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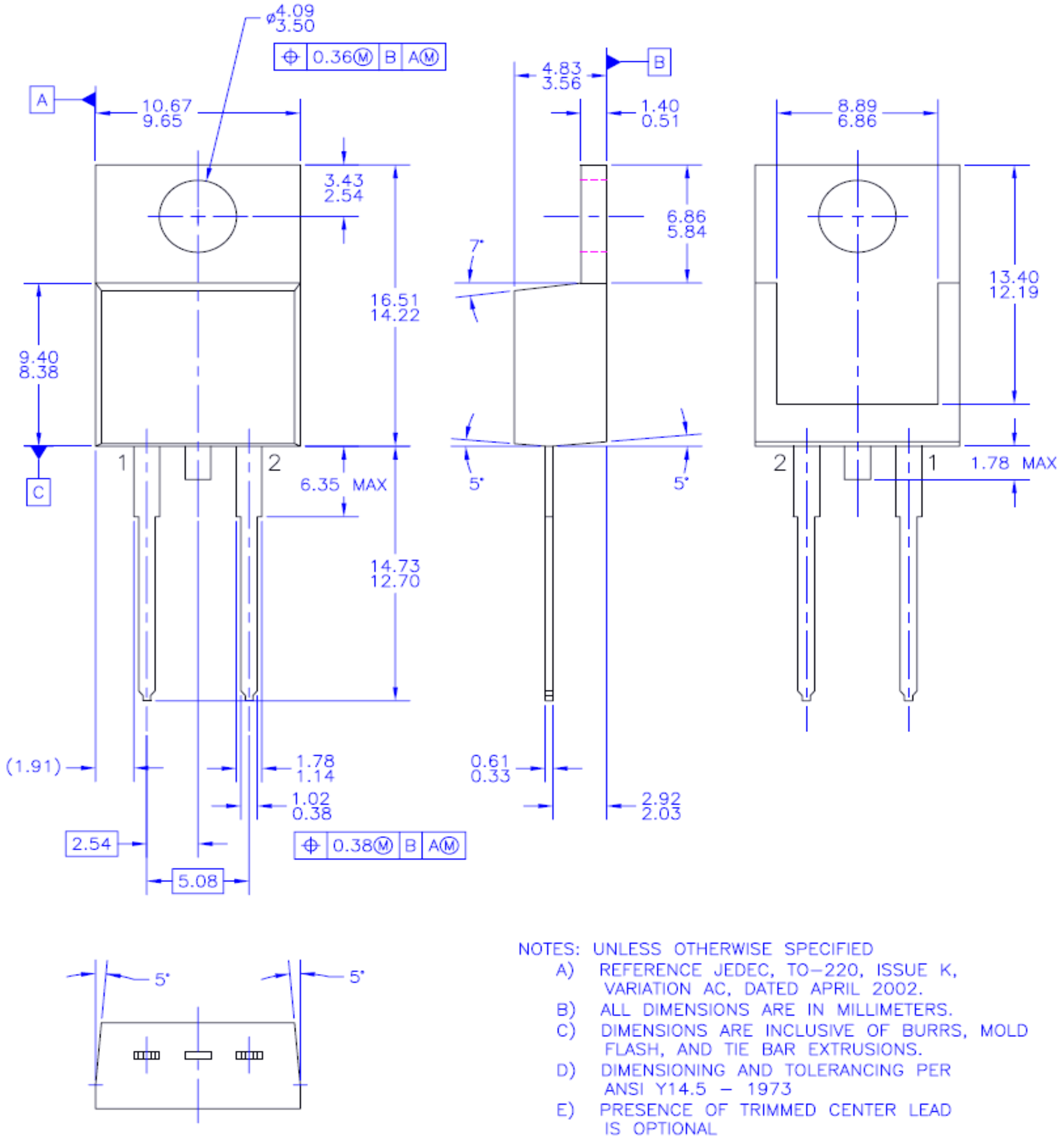
Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED
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B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 – 1973
E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL

Figure 18. TO-220 2L - 2LD,TO220,JEDEC TO-220 VARIATION AC

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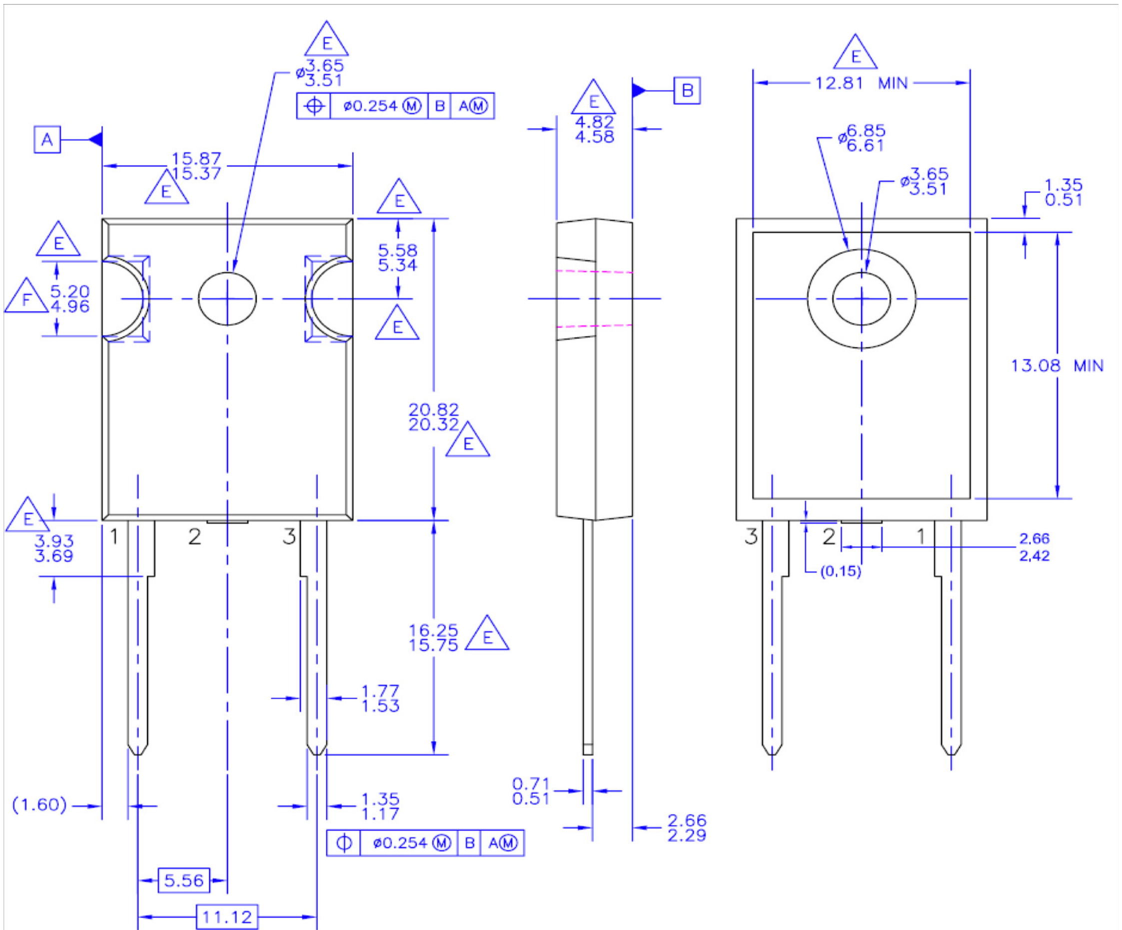
Mechanical Dimensions

TO247-2L



NOTES: UNLESS OTHERWISE SPECIFIED

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E. DOES NOT COMPLY JEDEC STANDARD VALUE

F. NOTCH MAY BE SQUARE

G. DRAWING FILENAME: MKT-TO247B02_REV02

Figure 9. TO-247,Molded, 2LD, Jedec Option AB

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Definition of Terms

Datasheet Identification	Product Status	Definition
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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I66

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