

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D T _c = +25°C
1200V	23mΩ @ V _{GS} = 18V	100A

Features and Benefits

- Low On-Resistance
- High BV_{DSS} Rating for Power Application
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Description and Applications

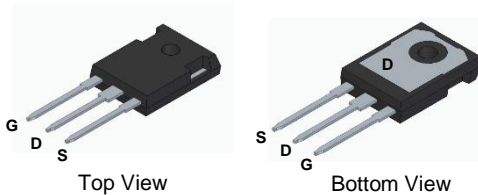
This SiC MOSFET is designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- SMPS (switching mode power supplies)
- UPS (uninterruptible power supplies)
- Energy storages
- EV charging systems
- Solar inverters

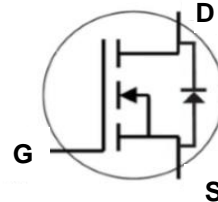
Mechanical Data

- Package: TO247
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 6.6 grams (Approximate)

TO247 Standard



Pin Configuration



Internal Schematic

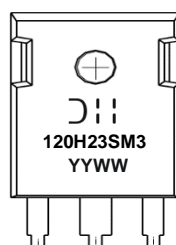
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMWSH120H23SM3	TO247 Standard	30 Pieces	Tube

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

TO247 Standard



= Manufacturer's Marking
 120H23SM3 = Product Type Marking Code
 YYWW or YYWW = Date Code Marking
 YY or YY = Last Two Digits of Year (ex: 24 = 2024)
 WW or WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	1200	V
Gate-Source Voltage	V _{GS}	-10/+22	V
Gate-Source Voltage (Recommended Operating Values)	V _{GS}	-4/+18	V
Gate-Source Transient Voltage, t _p < 1μs, t < 10 Hours over Lifetime	V _{GS}	-11/+25	V
Continuous Drain Current (Notes 5, 6)	I _D	T _C = +25°C	100
		T _C = +100°C	71
Continuous Diode Forward Current (Note 5)	I _S	76	A
Pulsed Source Current (10μs Pulse, Duty Cycle = 1%) (Note 5)	I _{SM}	280	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) (Note 5)	I _{DM}	280	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	T _C = +25°C	349
		T _C = +100°C	174
Thermal Resistance, Junction to Ambient (Note 7)	R _{θJA}	26.6	°C/W
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	0.43	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	1200	—	—	V	V _{GS} = 0, I _D = 100μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	50	μA	V _{DS} = 1200V, V _{GS} = 0
Gate-Source Leakage	I _{GSS}	—	—	±250	nA	V _{GS} = +18/-4V, V _{DS} = 0
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	1.8	2.5	3.6	V	V _{DS} = V _{GS} , I _D = 17.7mA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	17	23	mΩ	V _{GS} = 18V, I _D = 50A
		—	20	—	mΩ	V _{GS} = 15V, I _D = 50A
Diode Forward Voltage	V _{SD}	—	3.8	—	V	V _{GS} = -4V, I _S = 25A
Transconductance	g _{fs}	—	13	—	S	V _{DS} = 20V, I _D = 50A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	3962	—	pF	V _{GS} = 0, V _{DS} = 1000V V _{AC} = 25mV, f = 1MHz
Output Capacitance	C _{oss}	—	184	—		
Reverse Transfer Capacitance	C _{rss}	—	9.1	—		
C _{oss} Stored Energy	E _{oss}	—	110	—	μJ	
Turn-On Switching Energy (Body Diode Forward)	E _{ON}	—	676	—	μJ	V _{GS} = -4V/+18V, V _{DS} = 800V R _g = 5Ω, I _D = 50A, L = 157μH
Turn-Off Switching Energy (Body Diode Forward)	E _{OFF}	—	486	—		
Gate Resistance	R _g	—	1.2	—	Ω	V _{AC} = 100mV, f = 1MHz
Total Gate Charge	Q _g	—	217	—	nC	V _{GS} = -4V/+18V, V _{DS} = 800V I _D = 50A
Gate-Source Charge	Q _{gs}	—	60.4	—		
Gate-Drain Charge	Q _{gd}	—	53.4	—		
Turn-On Delay Time	t _{D(ON)}	—	21.0	—	ns	V _{GS} = -4V/+18V, V _{DS} = 800V R _g = 5Ω, I _D = 50A Inductive Load
Turn-On Rise Time	t _r	—	39.5	—		
Turn-Off Delay Time	t _{D(OFF)}	—	51.4	—		
Turn-Off Fall Time	t _f	—	14.3	—		
Body Diode Reverse-Recovery Time	t _{RR}	—	23.1	—	ns	V _{GS} = -4V, V _{DS} = 800V I _D = 50A, di/dt = 2600A/μs
Body Diode Reverse-Recovery Charge	Q _{RR}	—	424	—	nC	
Body Diode Reverse-Recovery Current	I _{RRM}	—	29.7	—	A	

- Notes:
- Device mounted on an infinite heatsink.
 - Drain current limited by maximum junction temperature.
 - Device mounted on FR-4 substrate PC board, 2oz. copper, with minimum recommended pad layout.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

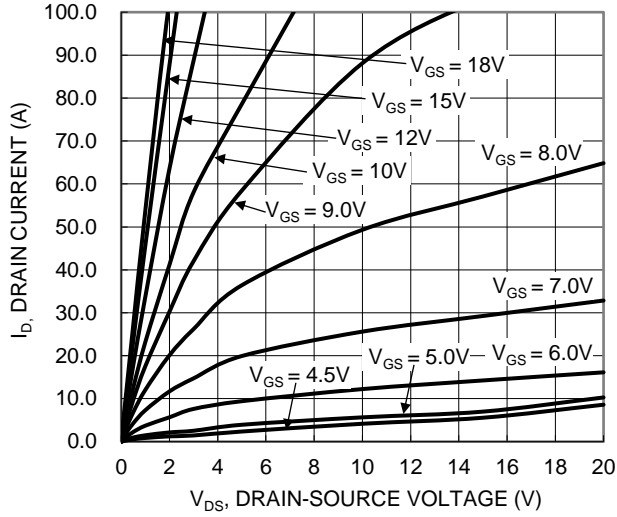


Figure 1. Typical Output Characteristic

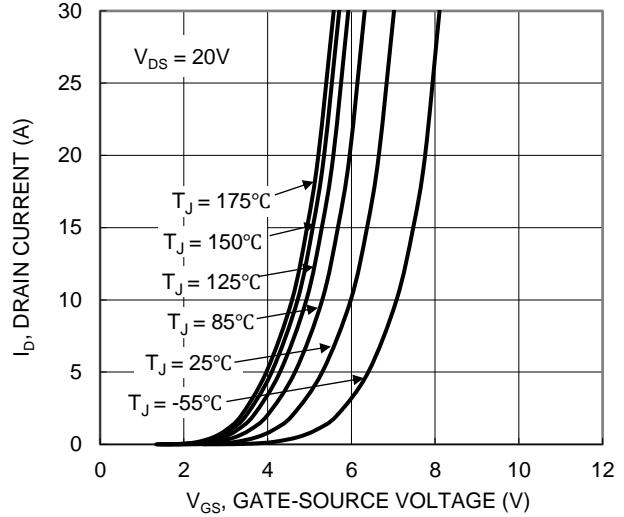


Figure 2. Typical Transfer Characteristic

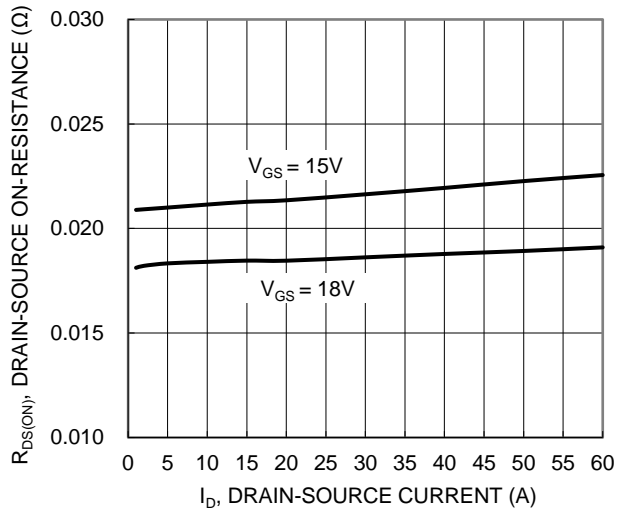


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

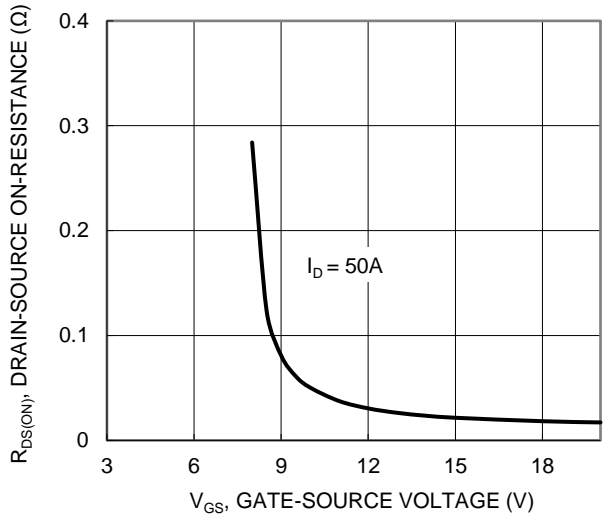


Figure 4. Typical Transfer Characteristic

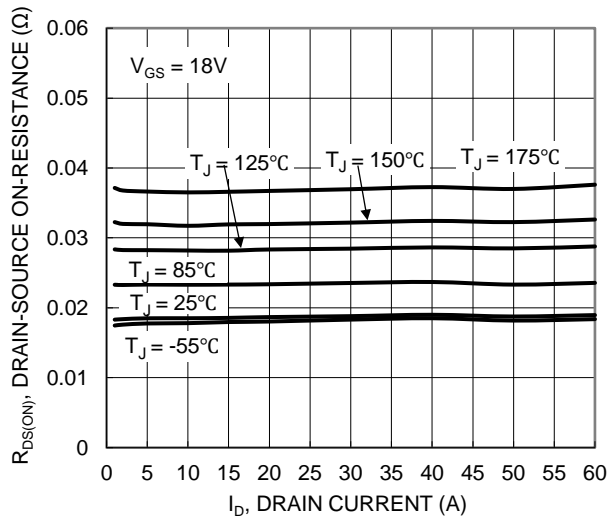


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

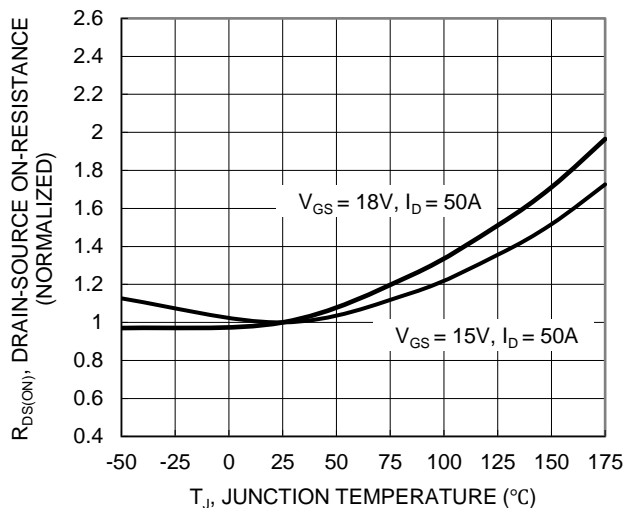


Figure 6. On-Resistance Variation with Junction Temperature

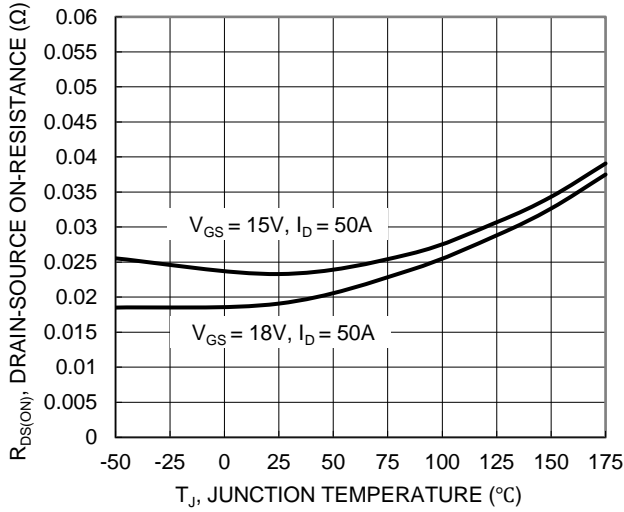


Figure 7. On-Resistance Variation with Junction Temperature

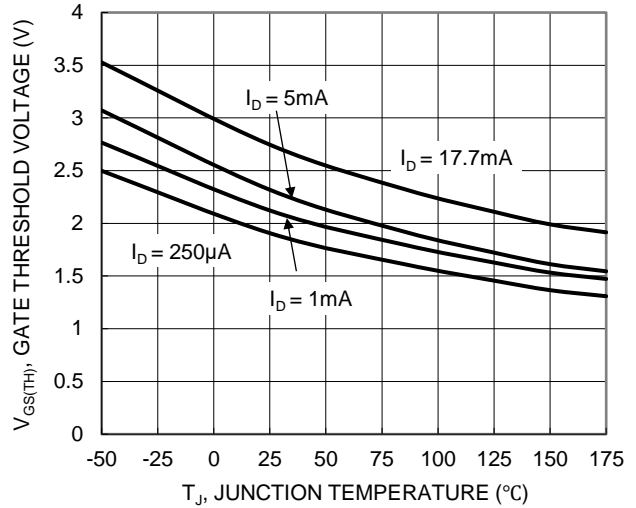


Figure 8. Gate Threshold Variation vs Junction Temperature

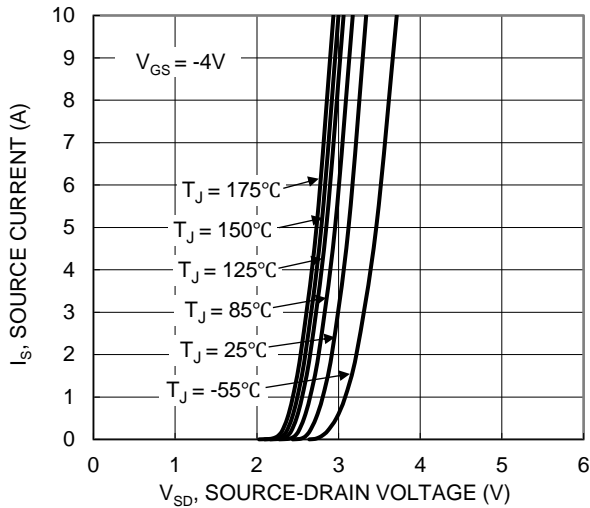


Figure 9. Diode Forward Voltage vs. Current

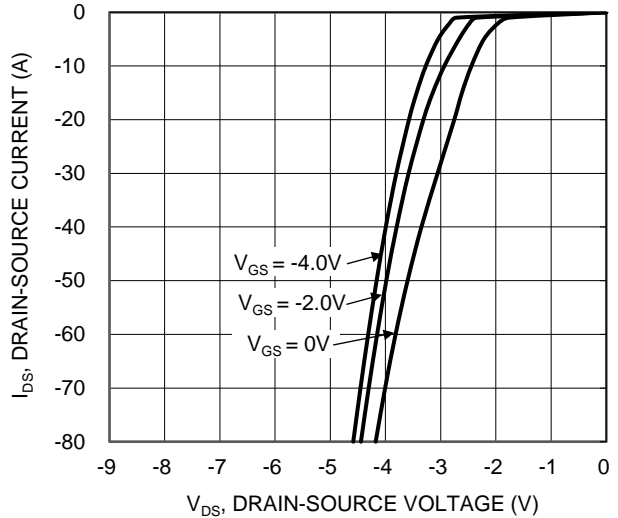


Figure 10. Body Diode Characteristic at 25°C

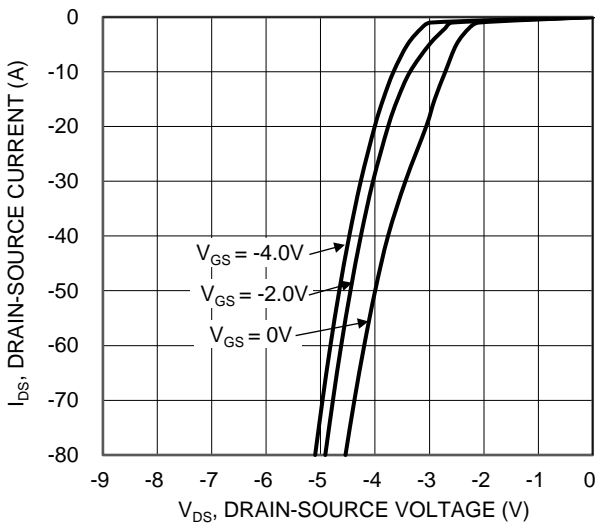


Figure 11. Body Diode Characteristic at -55°C

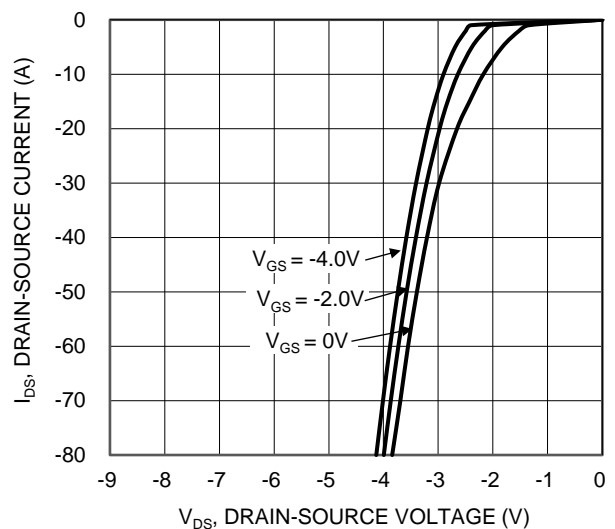


Figure 12. Body Diode Characteristic at 175°C

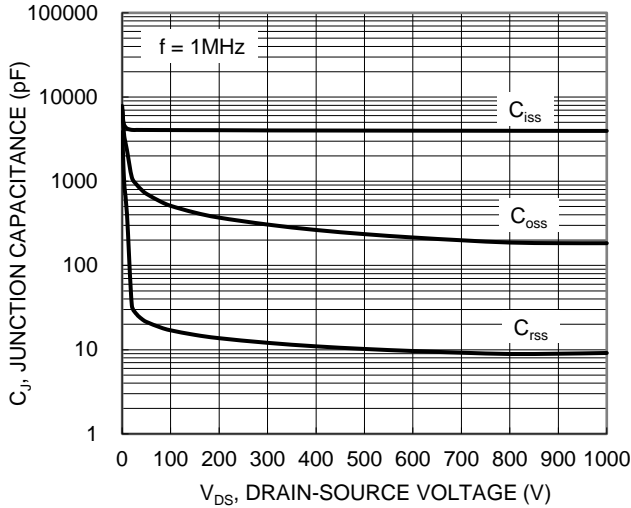


Figure 13. Typical Junction Capacitance

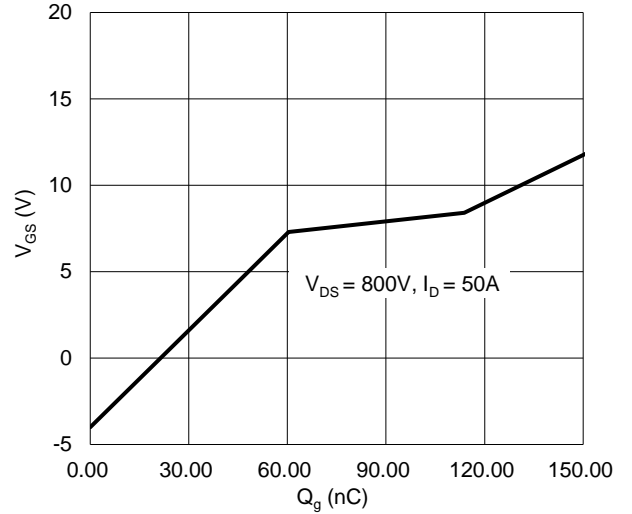


Figure 14. Gate Charge

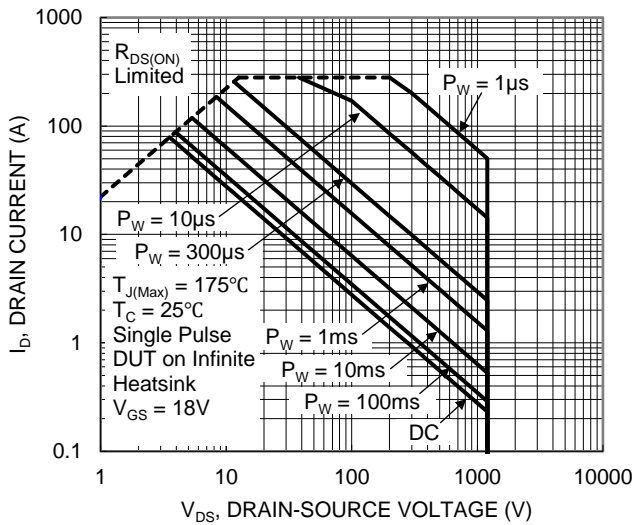


Figure 15. SOA, Safe Operation Area

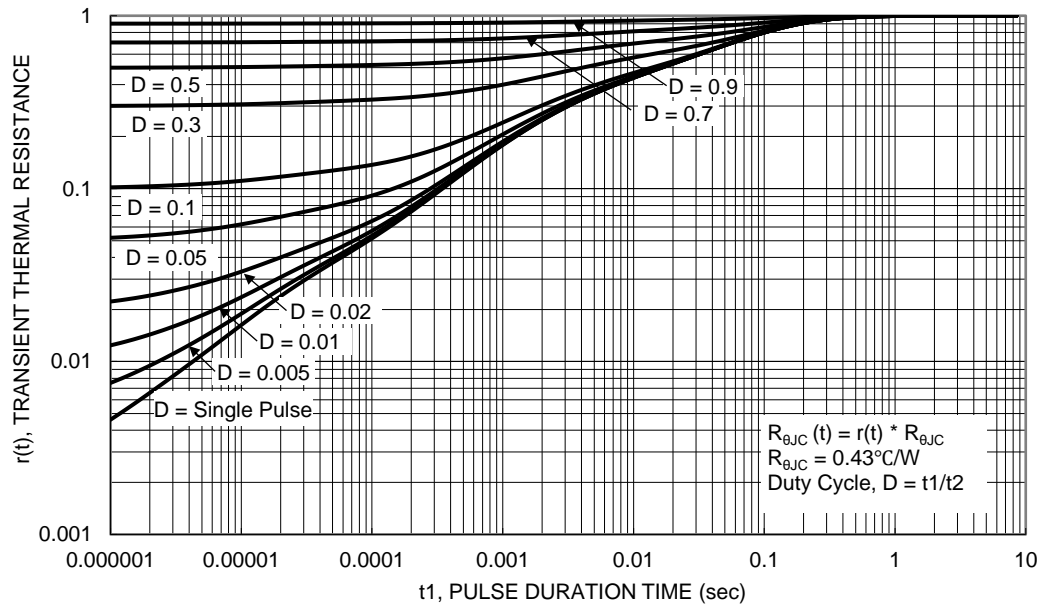
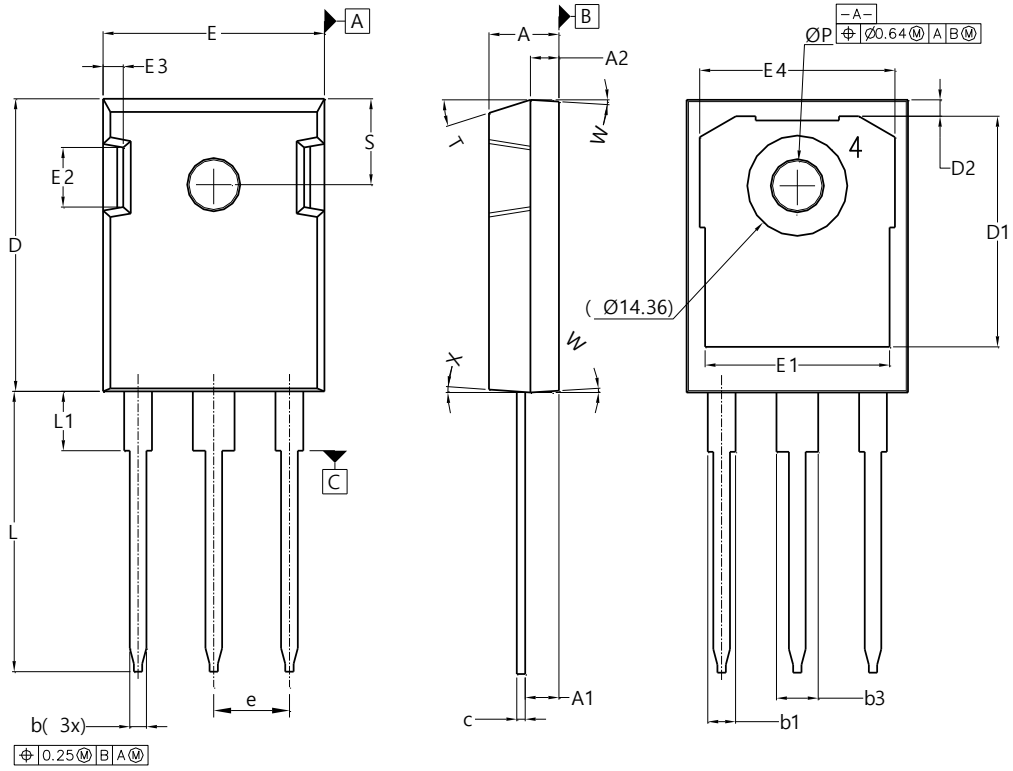


Figure 16. Transient Thermal Resistance

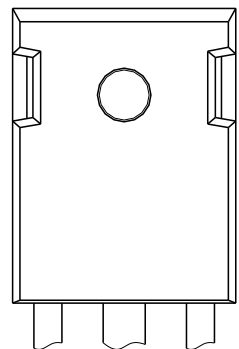
Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

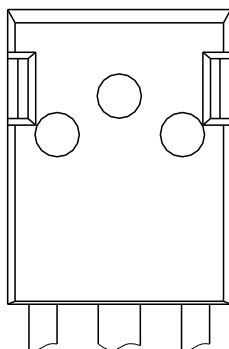
TO247 Standard



TO247 Standard			
Dim	Min	Max	Typ
A	4.83	5.21	--
A1	2.10	2.54	--
A2	1.88	2.16	--
b	1.07	1.33	--
b1	1.90	2.41	--
b3	2.87	3.38	--
c	0.51	0.76	0.60
D	20.80	21.75	--
D1	15.88	17.65	--
D2	0.95	1.77	--
E	15.75	16.25	--
E1	12.38	14.52	--
E2	3.68	5.10	--
E3	1.00	2.18	--
E4	13.10	14.52	--
e	5.44 BSC		
L	19.60	20.32	--
L1	3.78	4.40	--
PØ	2.90	3.65	--
S	6.04	6.80	--
T	17.5-20° REF		
W	3.5-4.5° REF		
X	4-5° REF		
All Dimensions in mm			



OPTION A
(TOP VIEW)



OPTION B
(TOP VIEW)

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