1200V N-CHANNEL SILICON CARBIDE POWER MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C
1200V	18mΩ @V_{GS} = 18V	108A

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)**
- **The DMWSH120H18HM4Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Description and Applications

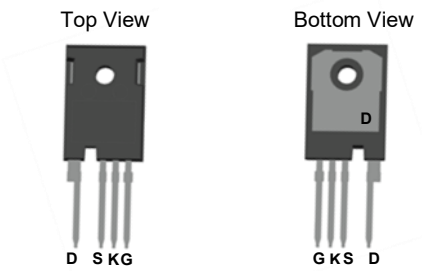
This SiC MOSFET is designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- SMPS (switching mode power supplies)
- UPS (uninterruptible power supplies)
- DC-DC converters for EV/HEV
- Solar inverters
- On-board chargers (OBC)

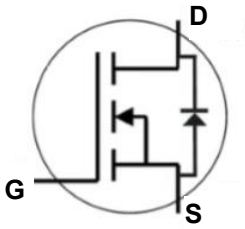
Mechanical Data

- Package: TO247-4
- 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 e3
- Weight: 6.6 grams (Approximate)

TO247-4 Standard



Pin Configuration



K (Driver Source)

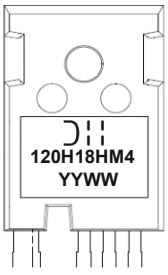
Internal Schematic

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMWSH120H18HM4Q	TO247-4 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



= Manufacturer's Marking
120H18HM4 = Product Type Marking Code
YYWW or YYWW = Date Code Marking
YY or YY = Last Two Digits of Year (ex: 25 = 2025)
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		$V_{GS(max)}$	-10/+22	V
Gate-Source Voltage (Recommended Operating Values)		$V_{GS(op)}$	-5/+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)	T_C = +25°C T_C = +100°C	I_D	108 76	A
Continuous Diode Forward Current (Note 5)		I_S	72	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%) (Note 5)		I_{SM}	303	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 5)		I_{DM}	303	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	313	W
	T_C = +100°C		156	
Thermal Resistance, Junction to Ambient (Note 7)		$R_{\theta JA}$	29.9	°C/W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.48	
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 = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	10	µA	V_{DS} = 1200V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = +22/-10V, V_{DS} = 0
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	2.04	2.6	4.4	V	V_{DS} = V_{GS}, I_D = 37mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	13	18	mΩ	V_{GS} = 18V, I_D = 75A
Diode Forward Voltage	V_{SD}	—	4.1	—	V	V_{GS} = -3V, I_S = 75A
Transconductance	gfs	—	20	—	S	V_{DS} = 10V, I_D = 75A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	4206	—	pF	V_{GS} = 0, V_{DS} = 800V V_{AC} = 25mV, f = 1MHz
Output Capacitance	C_{oss}	—	225	—		
Reverse Transfer Capacitance	C_{rss}	—	6.3	—		
C_{oss} Stored Energy	E_{oss}	—	92	—	µJ	
Turn-On Switching Energy (Body Diode Forward)	E_{ON}	—	1289	—	µJ	V_{GS} = -3V/+18V, V_{DS} = 800V R_g = 4.7Ω, I_D = 75A Inductive Load
Turn-Off Switching Energy (Body Diode Forward)	E_{OFF}	—	701	—		
Gate Resistance	R_g	—	1.2	—	Ω	V_{AC} = 25mV, f = 1MHz, I_D = 0A
Total Gate Charge	Q_g	—	158	—	nC	V_{GS} = -3V/+18V, V_{DS} = 800V I_D = 75A
Gate-Source Charge	Q_{gs}	—	63	—		
Gate-Drain Charge	Q_{gd}	—	32	—		
Turn-On Delay Time	$t_{D(ON)}$	—	21	—	ns	V_{GS} = -3V/+18V, V_{DD} = 800V R_g = 4.7Ω, I_D = 75A Inductive Load
Turn-On Rise Time	t_R	—	46	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	36	—		
Turn-Off Fall Time	t_F	—	9.5	—		
Body Diode Reverse-Recovery Time	t_{RR}	—	33	—	ns	V_{GS} = -3V, V_{DS} = 800V I_D = 75A, di/dt = 1000A/µs
Body Diode Reverse-Recovery Charge	Q_{RR}	—	380	—	nC	
Body Diode Reverse-Recovery Current	I_{RRM}	—	19	—	A	

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

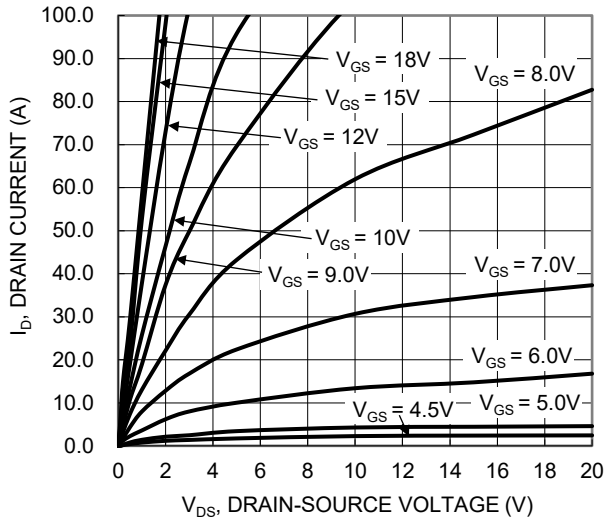


Figure 1. Typical Output Characteristic

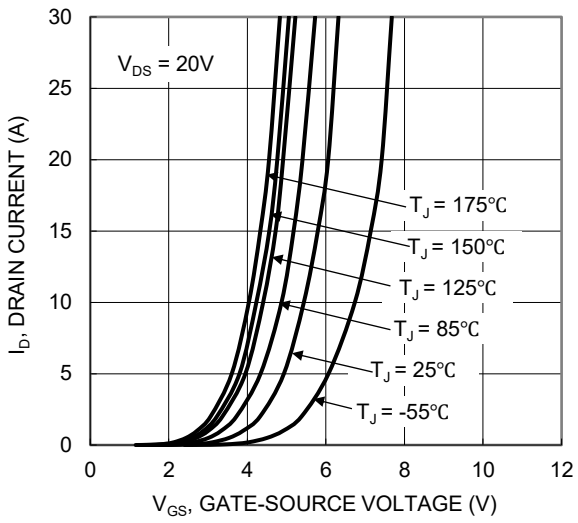


Figure 2. Typical Transfer Characteristic

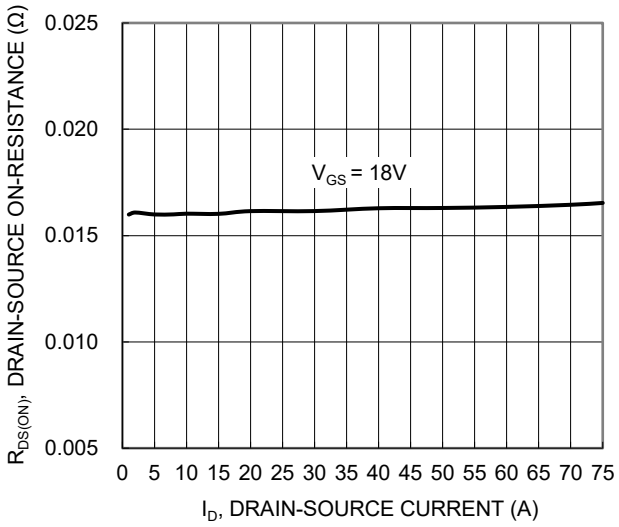


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

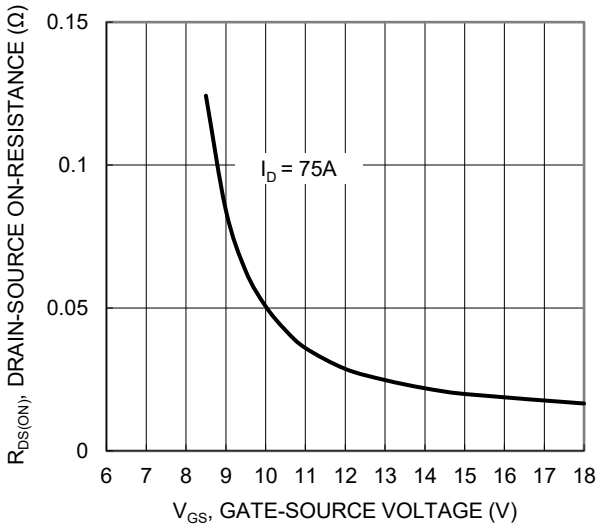


Figure 4. Typical Transfer Characteristic

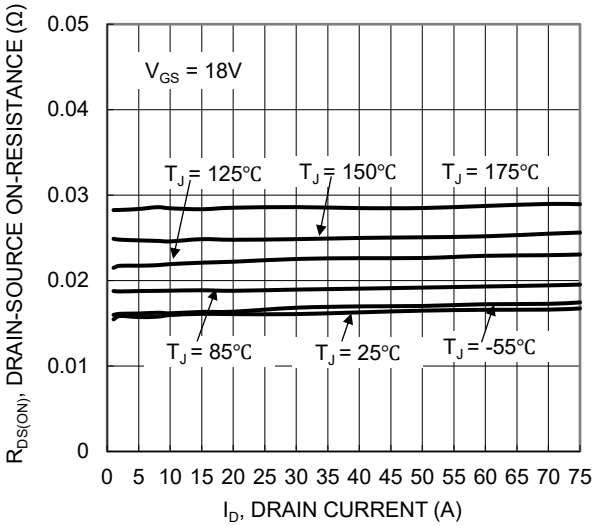


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

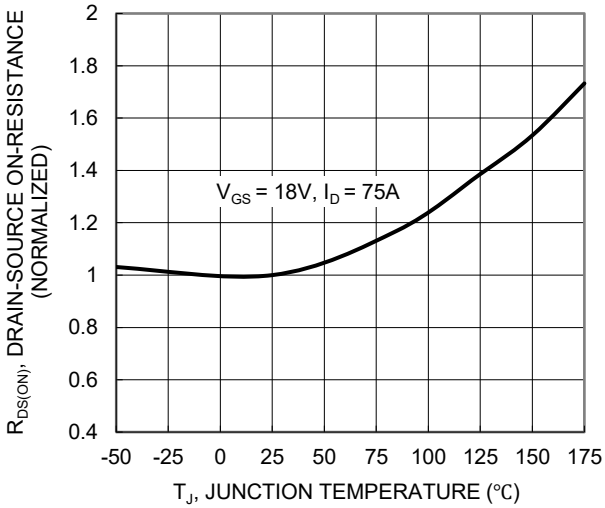


Figure 6. On-Resistance Variation with Temperature

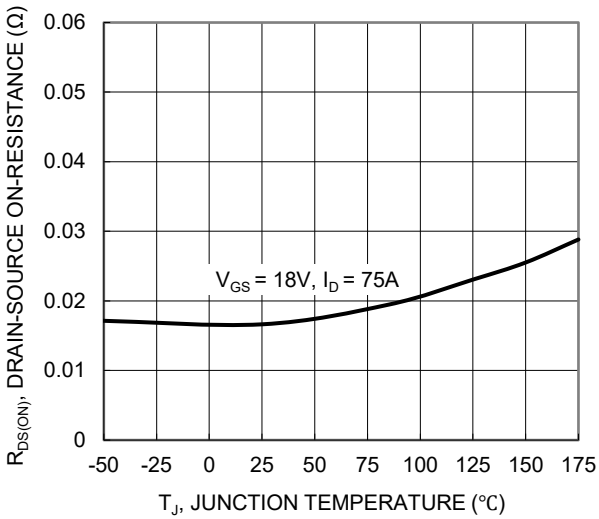


Figure 7. On-Resistance Variation with Temperature

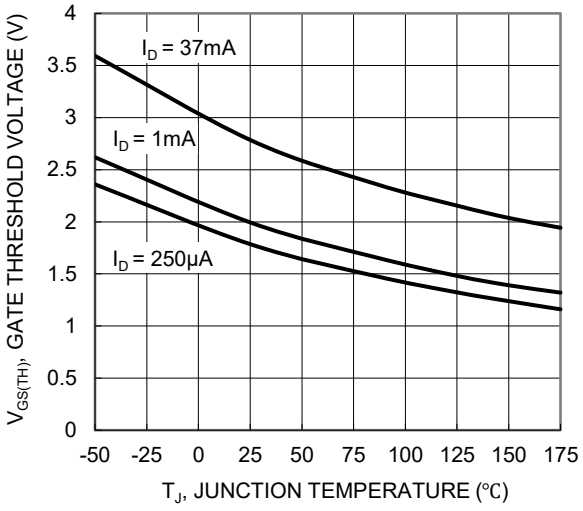


Figure 8. Gate Threshold Variation vs. Junction Temperature

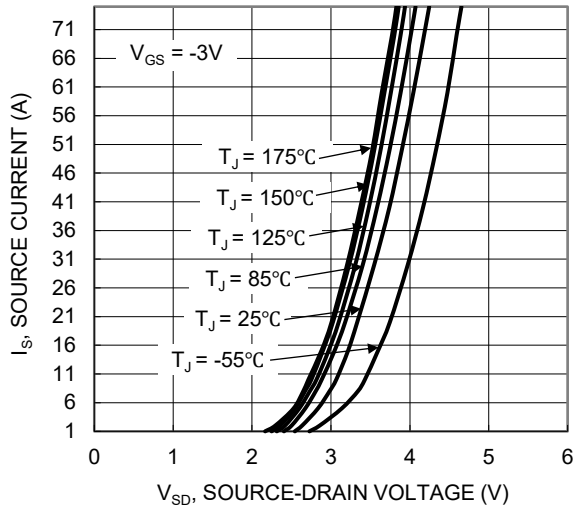


Figure 9. Diode Forward Voltage vs. Current

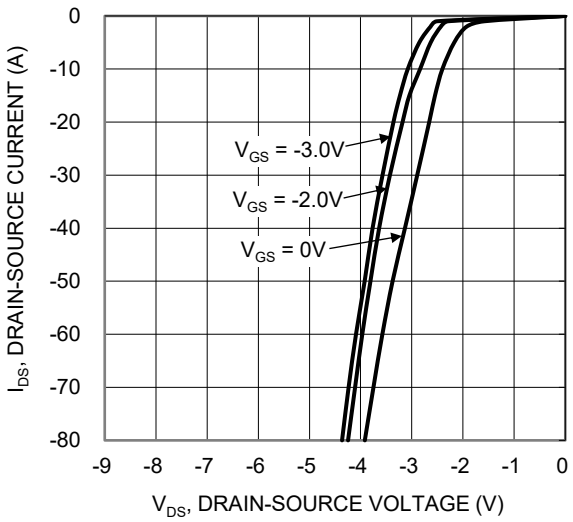


Figure 10. Body Diode Characteristic at 25°C

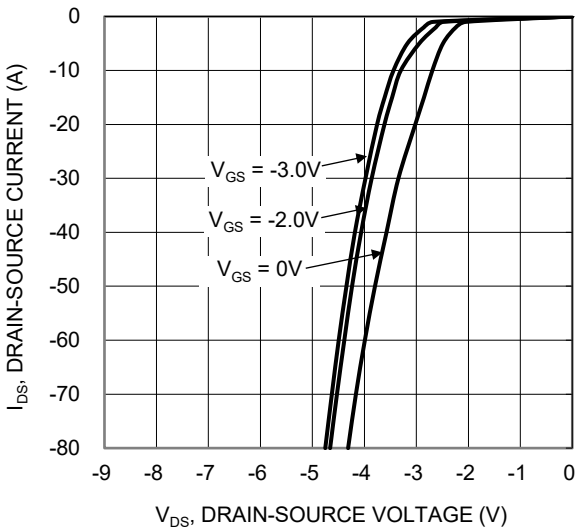


Figure 11. Body Diode Characteristic at -55°C

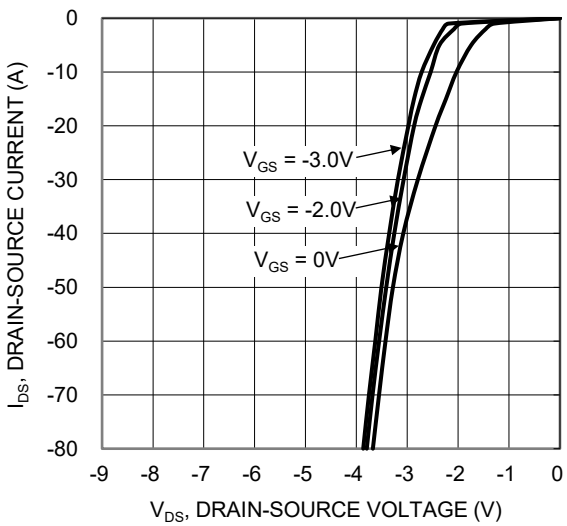


Figure 12. Body Diode Characteristic at 175°C

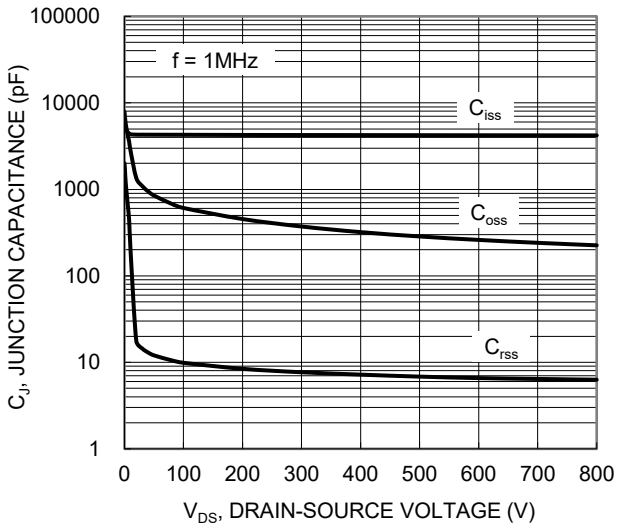


Figure 13. Typical Junction Capacitance

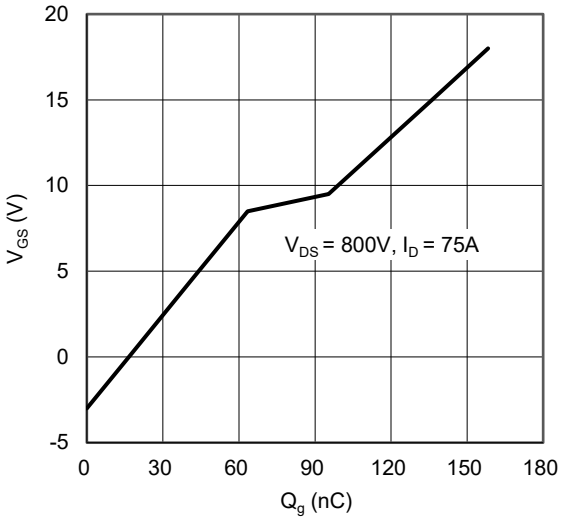


Figure 14. Gate Charge

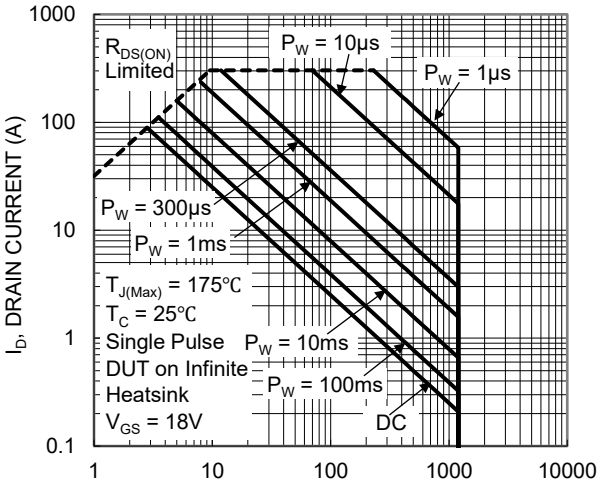


Figure 15. SOA, Safe Operation Area

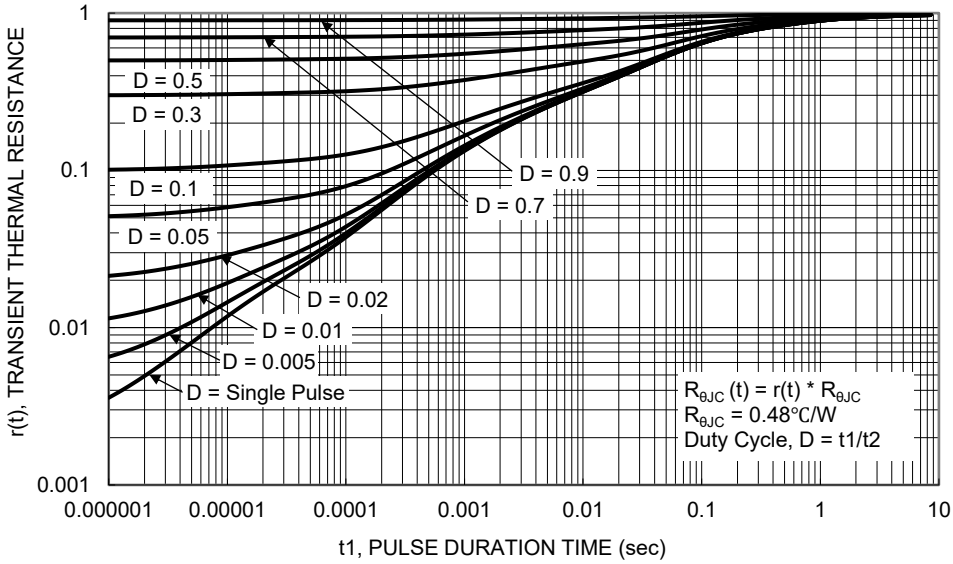
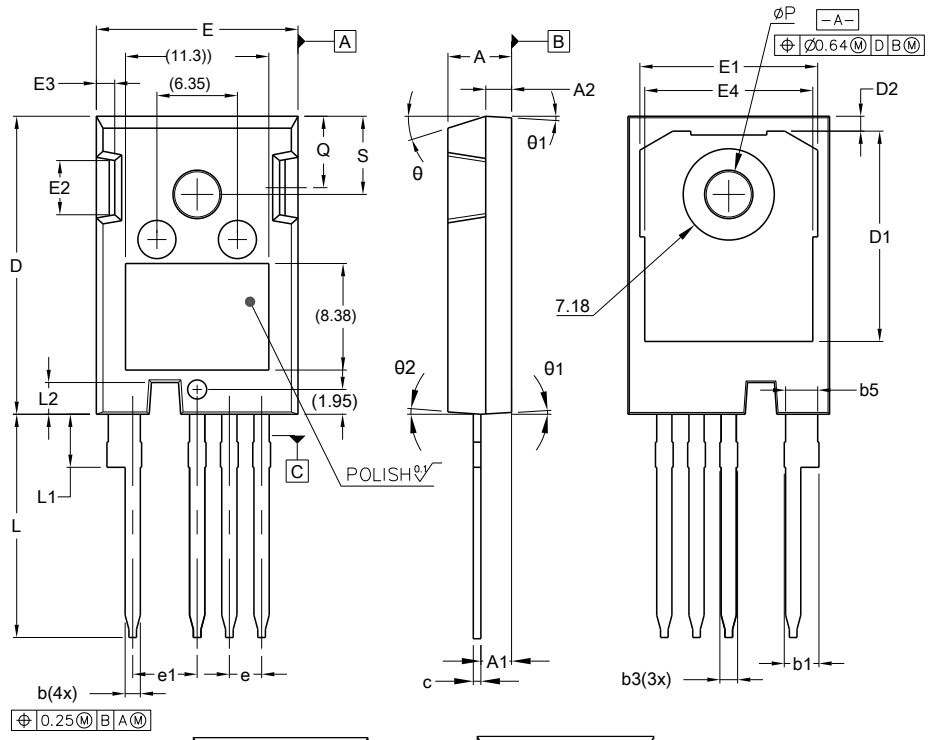


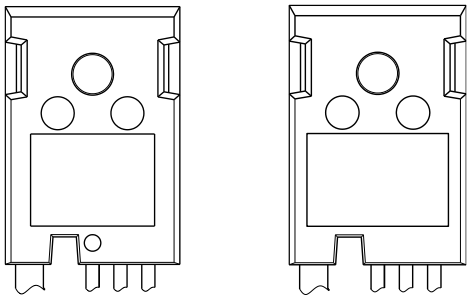
Figure 16. Transient Thermal Resistance

Package Outline Dimensions

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

TO247-4 Standard





OPTION A
(TOP VIEW)

OPTION B
(TOP VIEW)

TO247-4 Standard		
Dim	**Min**	**Max**
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b	1.07	1.33
b1	2.39	2.94
b3	1.07	1.60
b5	2.39	2.69
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.30
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
ØP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
θ	17.5°- 20° REF	
θ1	3.5°- 5° REF	
θ2	4°- 5° REF	
All Dimensions in mm		

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