Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D T_C = +25°C
1200V	43mΩ @ V_{GS} = 15V	70.5A

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 DMWSH120H43SM3Q 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

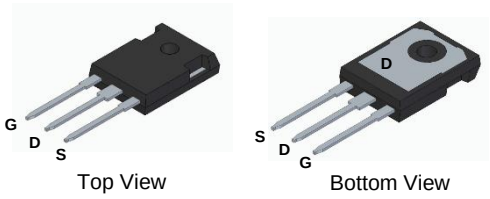
This SiC MOSFET is designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- EV high-power DC-DC converters
- EV charging systems
- AC-DC traction inverters
- Solar inverters
- Automotive motor drivers

Mechanical Data

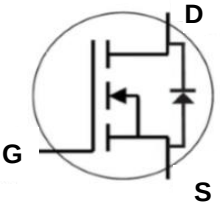
- Package: TO247
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 5.6 grams (Approximate)

TO247 Standard



Top View Bottom View

Pin Configuration



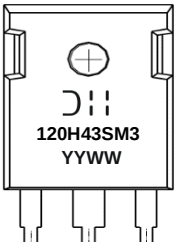
Internal Schematic

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMWSH120H43SM3Q	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



= Manufacturer's Marking
120H43SM3 = 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)

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	1200	V
Gate-Source Voltage		V_{GSS}	+19/-8	V
Gate-Source Voltage (Recommended Operating Values)		V_{GSS}	+15/-4	V
Continuous Drain Current (Notes 5, 6)	T_C = +25°C T_C = +100°C	I_D	70.5 49.8	A
Continuous Diode Forward Current (Note 5)		I_S	64	A
Pulsed Source Current (Pulse Width t_P Limited by $T_{J\,Max}$) (Note 5)		I_{SM}	193	A
Pulsed Drain Current (Pulse Width t_P Limited by $T_{J\,Max}$) (Note 5)		I_{DM}	193	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	320	W
	T_C = +100°C		160	
Thermal Resistance, Junction to Ambient (Note 7)		$R_{\theta JA}$	28.6	°C/W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.47	
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} = +15/-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 = 11.5mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	33	43	mΩ	V_{GS} = 15V, I_D = 40A
Diode Forward Voltage	V_{SD}	—	3.8	—	V	V_{GS} = -4V, I_S = 20A
Transconductance	gfs	—	8.8	—	S	V_{DS} = 20V, I_D = 40A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2216	—	pF	V_{GS} = 0, V_{DS} = 1000V V_{AC} = 25mV, f = 1MHz
Output Capacitance	C_{oss}	—	109	—		
Reverse Transfer Capacitance	C_{rss}	—	7.1	—		
C_{oss} Stored Energy	E_{oss}	—	72	—	µJ	
Turn-On Switching Energy (Body Diode Forward)	E_{ON}	—	1492	—	µJ	V_{GS} = -4V/+15V, V_{DS} = 800V R_g = 5Ω, I_D = 40A, L = 157µH
Turn-Off Switching Energy (Body Diode Forward)	E_{OFF}	—	427	—		
Gate Resistance	R_g	—	1.3	—	Ω	V_{AC} = 100mV, f = 1MHz
Total Gate Charge	Q_g	—	118	—	nC	V_{GS} = -4V/+15V, V_{DS} = 800V I_D = 40A
Gate-Source Charge	Q_{gs}	—	36.5	—		
Gate-Drain Charge	Q_{gd}	—	35.8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	16.3	—	ns	V_{GS} = -4V/+15V, V_{DD} = 800V R_g = 5Ω, I_D = 40A Inductive Load
Turn-On Rise Time	t_R	—	77.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	29.7	—		
Turn-Off Fall Time	t_F	—	14.3	—		
Body Diode Reverse-Recovery Time	t_{RR}	—	13.5	—	ns	V_{GS} = -4V, V_{DS} = 800V I_D = 40A, di/dt = 1500A/µs
Body Diode Reverse-Recovery Charge	Q_{RR}	—	158	—	nC	
Body Diode Reverse-Recovery Current	I_{RRM}	—	19.6	—	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.

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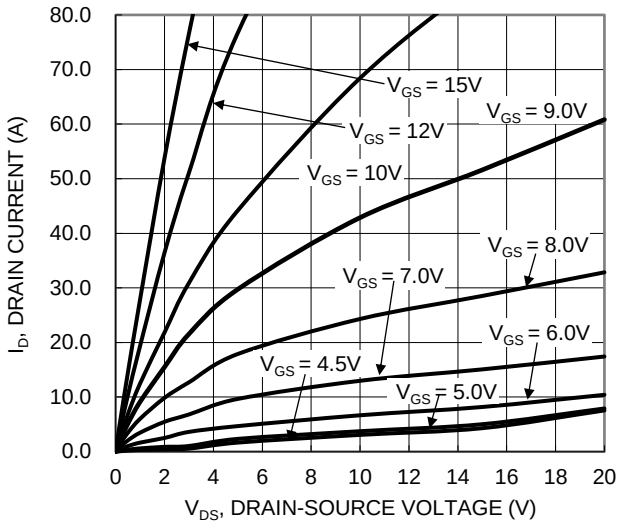


Figure 1. Typical Output Characteristic

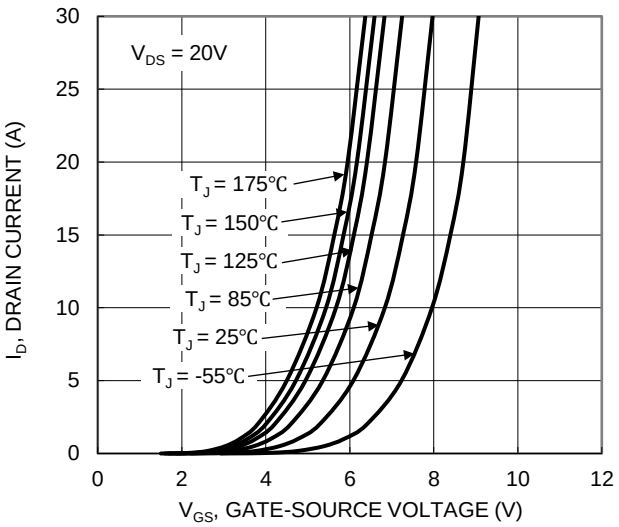


Figure 2. Typical Transfer Characteristic

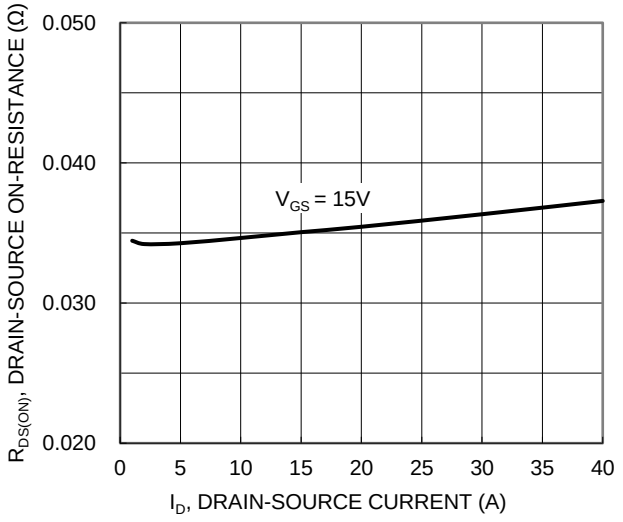


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

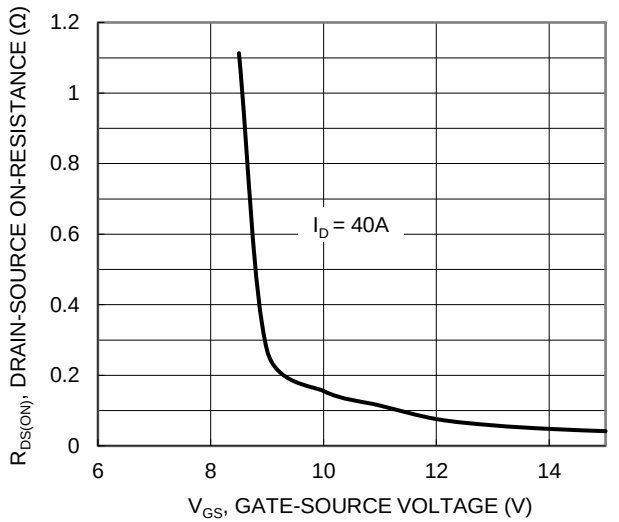


Figure 4. Typical Transfer Characteristic

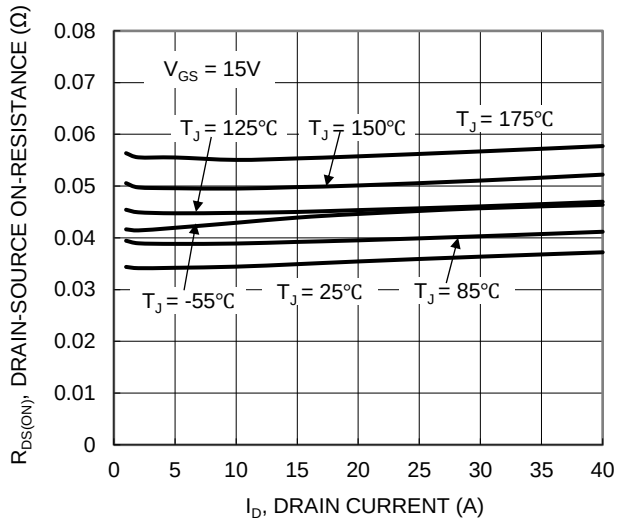


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

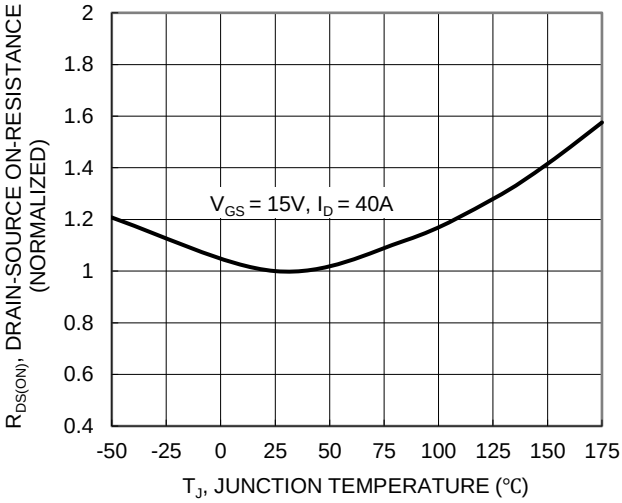


Figure 6. On-Resistance Variation with Junction Temperature

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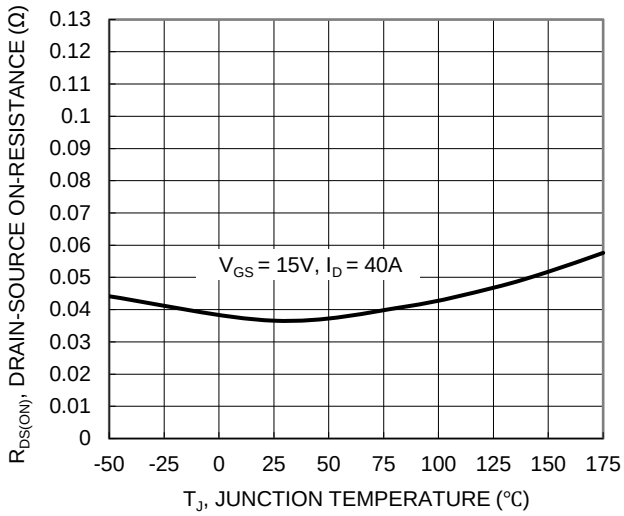


Figure 7. On-Resistance Variation with Junction Temperature

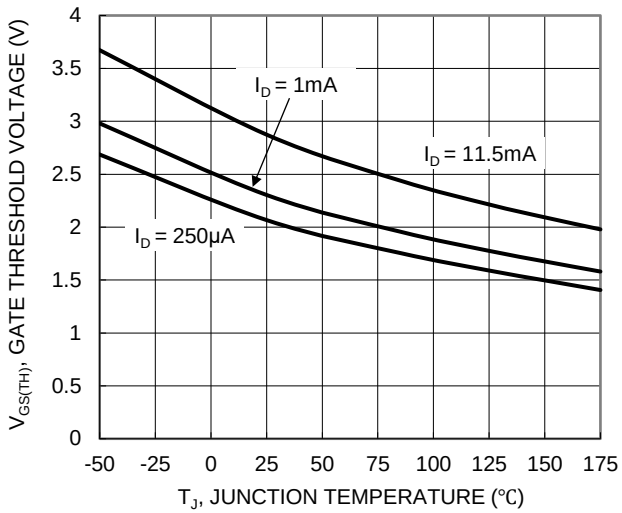


Figure 8. Gate Threshold Variation vs. Junction Temperature

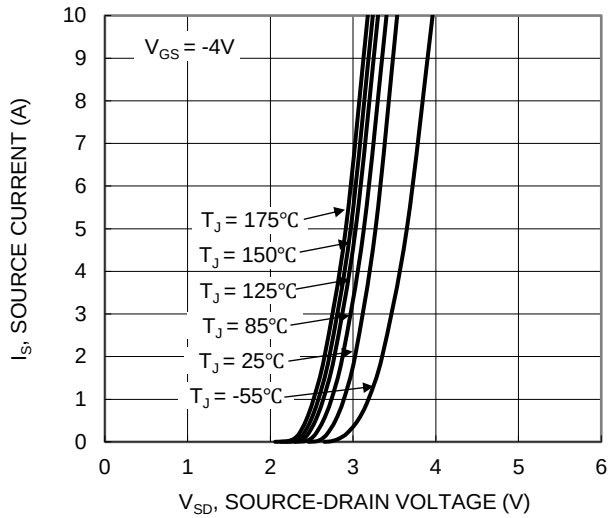


Figure 9. Diode Forward Voltage vs. Current

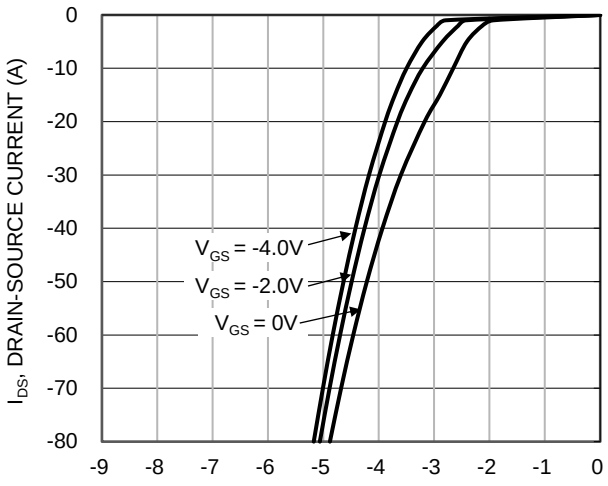


Figure 10. Body Diode Characteristic at 25℃

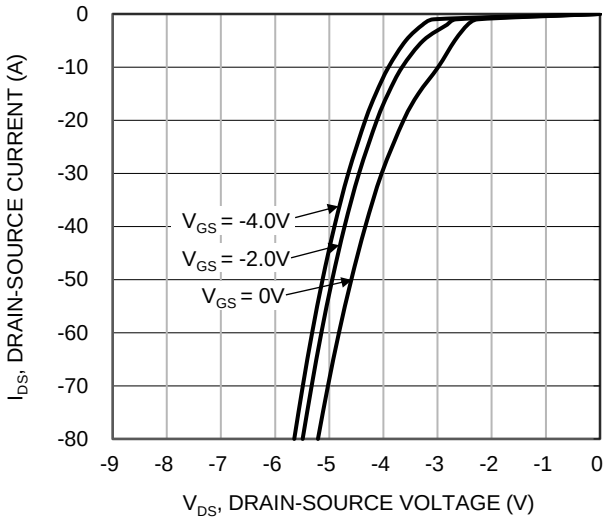


Figure 11. Body Diode Characteristic at -55℃

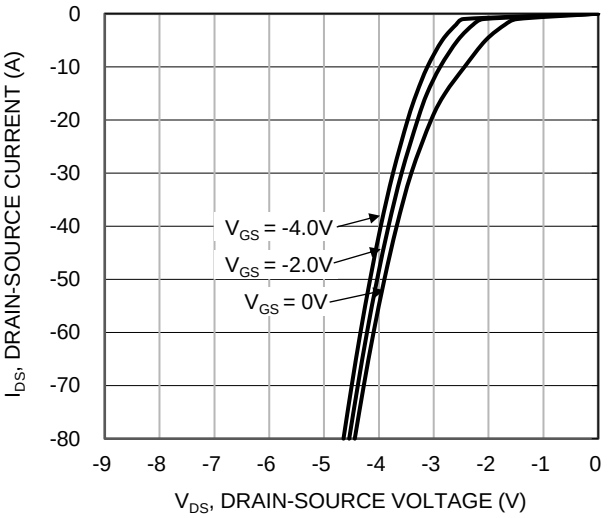


Figure 12. Body Diode Characteristic at 175℃

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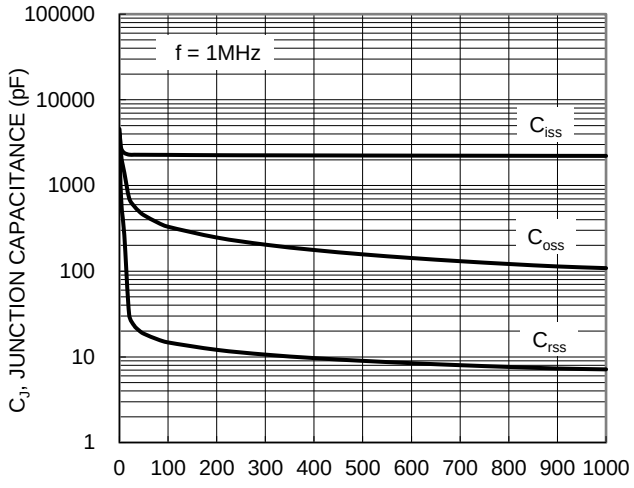


Figure 13. Typical Junction Capacitance

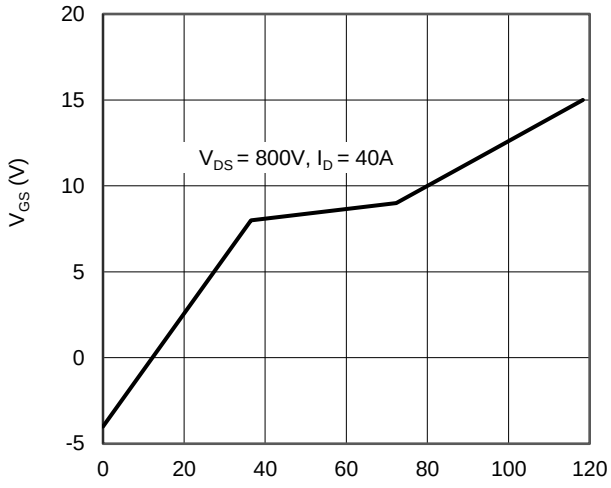


Figure 14. Gate Charge

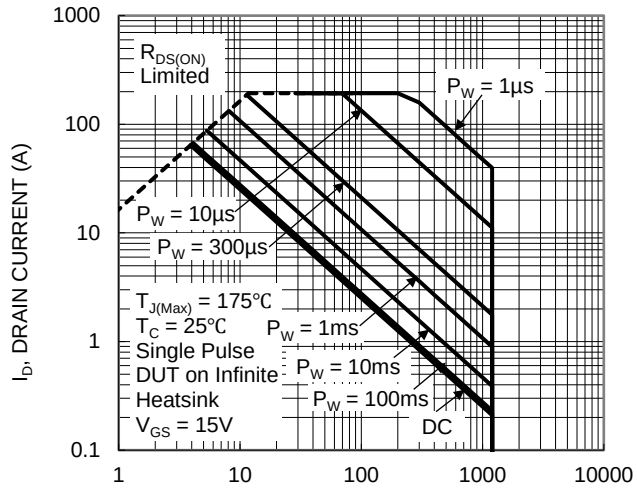


Figure 15. SOA, Safe Operation Area

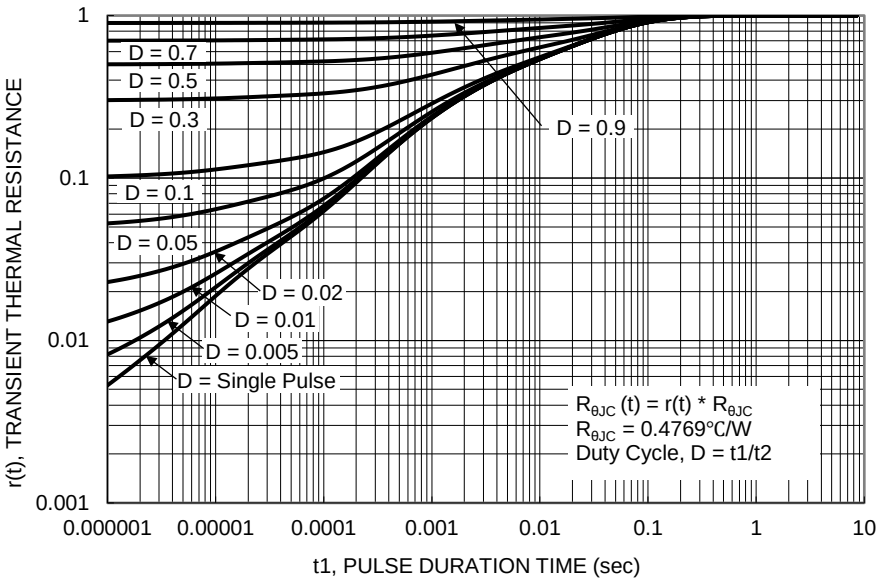


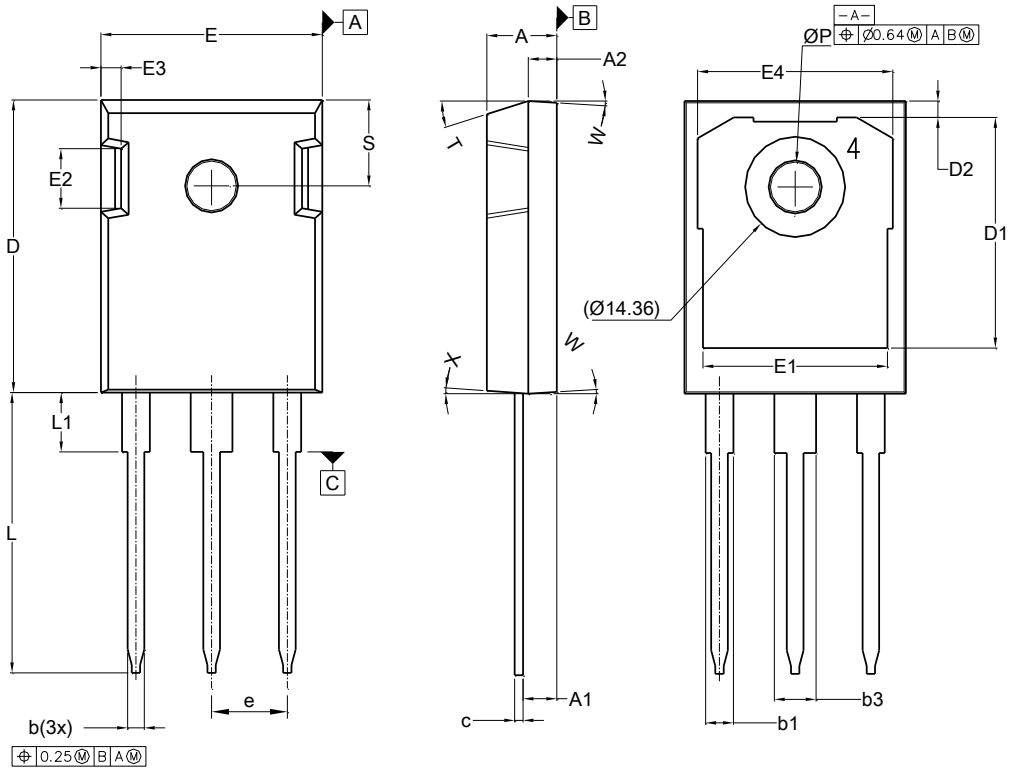
Figure 16. Transient Thermal Resistance

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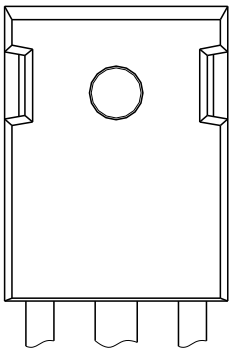
Package Outline Dimensions

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

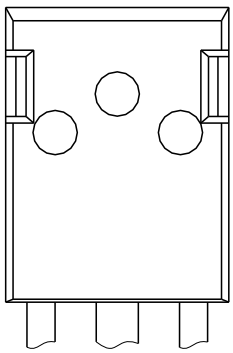
TO247 Standard



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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