DMWSH120H90SCT7Q

1200V N-CHANNEL SILICON CARBIDE POWER MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)\ MAX}$	I_D T_C = +25°C
1200V	90mΩ @ V_{GS} = 15V	38.2

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 DMWSH120H90SCT7Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 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.

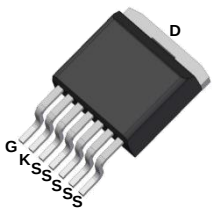
- Switch mode power supplies
- Motor drives
- High-voltage DC-DC converters
- Solar inverters
- EV battery chargers

Mechanical Data

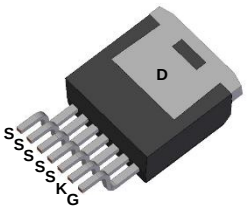
- Package: TO263-7
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 1.524 grams (Approximate)

TO263-7

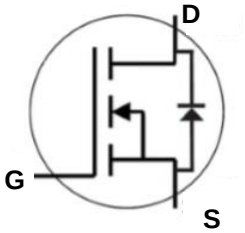
Top View



Bottom View



Pin Configuration



Internal Schematic

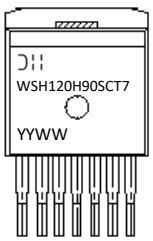
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMWSH120H90SCT7Q	TO263-7	50	Tube
DMWSH120H90SCT7Q-13	TO263-7	800	Tape & Reel

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

TO263-7



= Manufacturer's Marking
WSH120H90SCT7 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 24 = 2024)
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 (Dynamic)		V_{GSS}	+19/-8	V
Gate-Source Voltage (Static)		V_{GSS}	+15/-4	V
Continuous Drain Current (Notes 5 & 6)	T_C = +25°C T_C = +100°C	I_D	38.2 27.0	A
Continuous Diode Forward Current (Note 5)		I_S	34	A
Pulsed Source Current (Pulse Width t_P Limited by $T_{J\,Max}$) (Note 5)		I_{SM}	97	A
Pulsed Drain Current (Pulse Width t_P Limited by $T_{J\,Max}$) (Note 5)		I_{DM}	97	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	197	W
	T_C = +100°C		99	
Thermal Resistance, Junction to Ambient (Note 7)		$R_{\theta JA}$	58.5	°C/W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	0.76	
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} = 0V, I_D = 100µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	50	µA	V_{DS} = 1200V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±200	nA	V_{GS} = +15/-4V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.7	2.5	3.5	V	V_{DS} = V_{GS}, I_D = 5mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	75	90	mΩ	V_{GS} = 15V, I_D = 20A
Diode Forward Voltage	V_{SD}	—	4.5	—	V	V_{GS} = -4V, I_S = 10A
Transconductance	gfs	—	5.0	—	S	V_{DS} = 20V, I_D = 20A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1078	—	pF	V_{GS} = 0V, V_{DS} = 1000V V_{AC} = 25mV, f = 1MHz
Output Capacitance	C_{oss}	—	57	—		
Reverse Transfer Capacitance	C_{rss}	—	4.9	—		
Coss Stored Energy	E_{oss}	—	34.2	—	µJ	
Turn-On Switching Energy (Body Diode FWD)	E_{ON}	—	175	—	µJ	V_{GS} = -4V/+15V, V_{DS} = 800V R_g = 5Ω, I_D = 20A, L = 156µH
Turn-Off Switching Energy (Body Diode FWD)	E_{OFF}	—	56	—		
Gate Resistance	R_g	—	2.79	—	Ω	V_{AC} = 100mV, f = 1MHz
Total Gate Charge	Q_g	—	54.6	—	nC	V_{GS} = -4V/+15V, V_{DS} = 800V I_D = 20A
Gate-Source Charge	Q_{gs}	—	16.5	—		
Gate-Drain Charge	Q_{gd}	—	22.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	9.1	—	ns	V_{GS} = -4V/+15V, V_{DS} = 800V R_g = 5Ω, I_D = 20A Inductive Load
Turn-On Rise Time	t_R	—	18.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.2	—		
Turn-Off Fall Time	t_F	—	8.5	—		
Body Diode Reverse Recovery Time	t_{RR}	—	11.5	—	ns	V_{GS} = -4V, V_{DS} = 800V I_F = 20A, di/dt = 3600A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	108	—	nC	
Body Diode Reverse Recovery Current	I_{RRM}	—	18.8	—	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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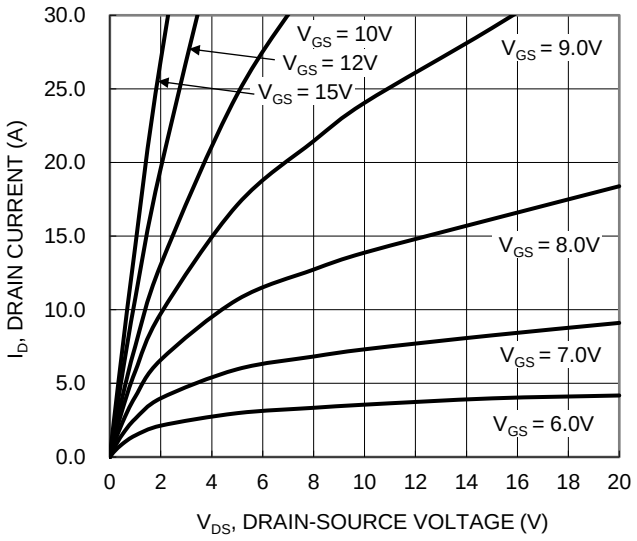


Figure 1. Typical Output Characteristic

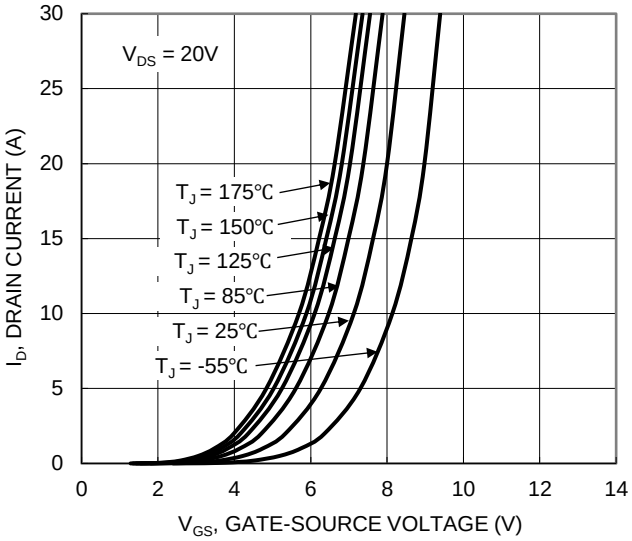


Figure 2. Typical Transfer Characteristic

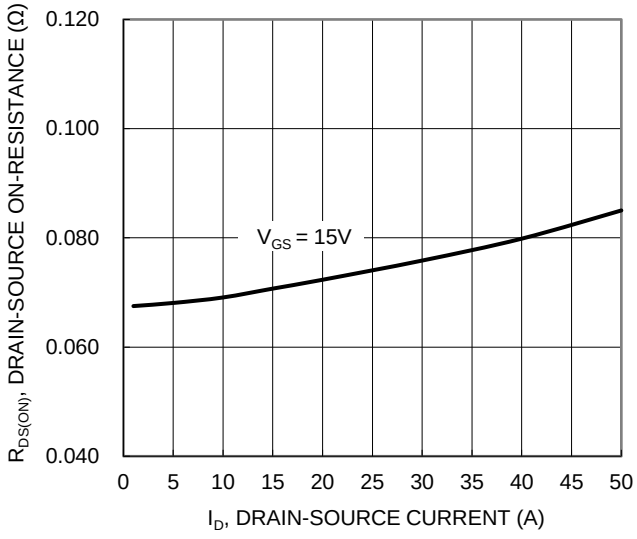


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

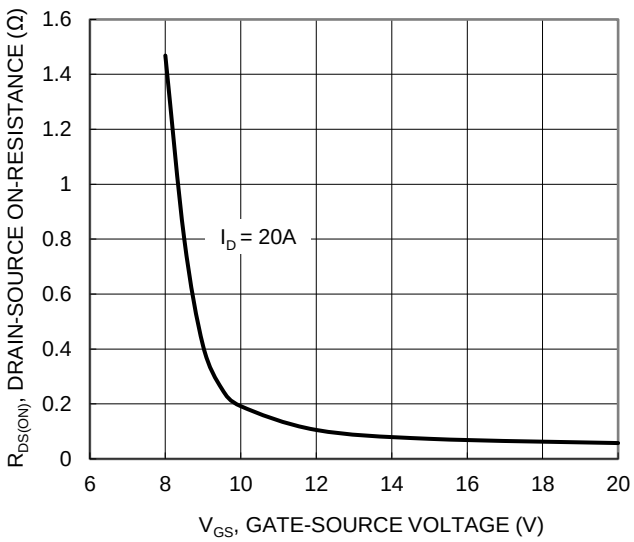


Figure 4. Typical Transfer Characteristic

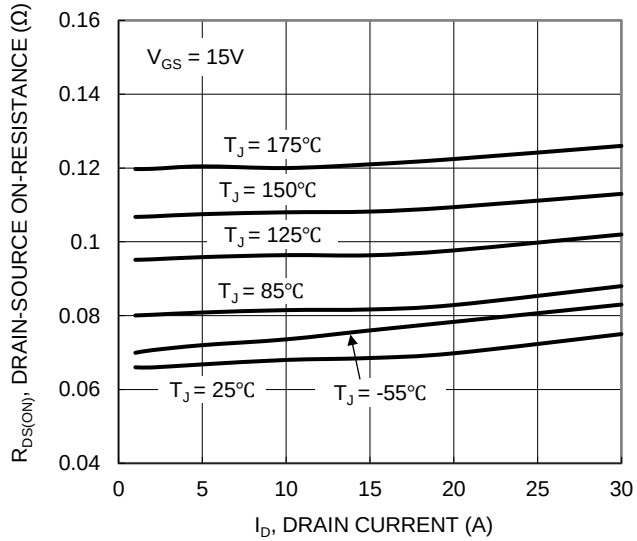


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

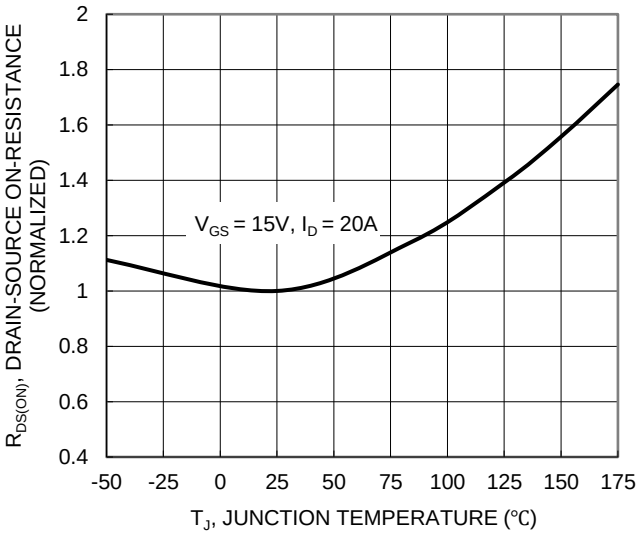


Figure 6. On-Resistance Variation with Junction Temperature

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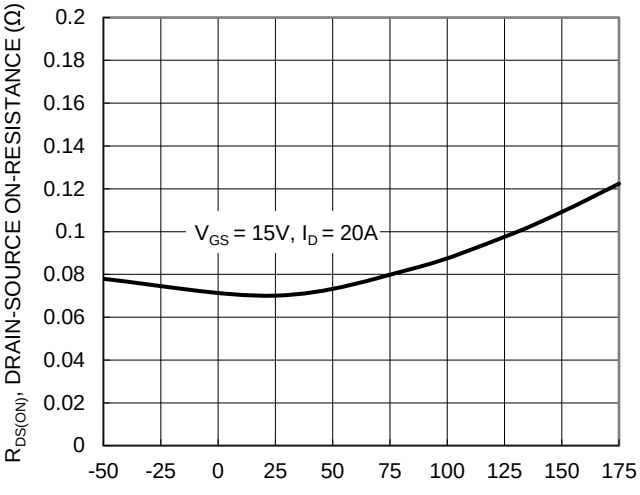


Figure 7.On-Resistance Variation with Junction Temperature

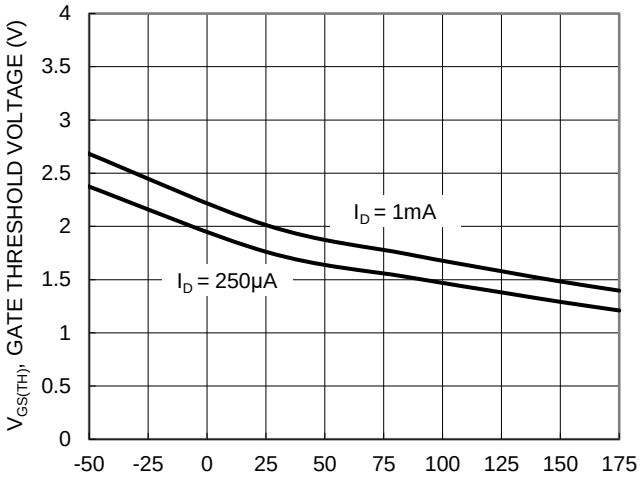


Figure 8. Gate Threshold Variation vs. Junction Temperature

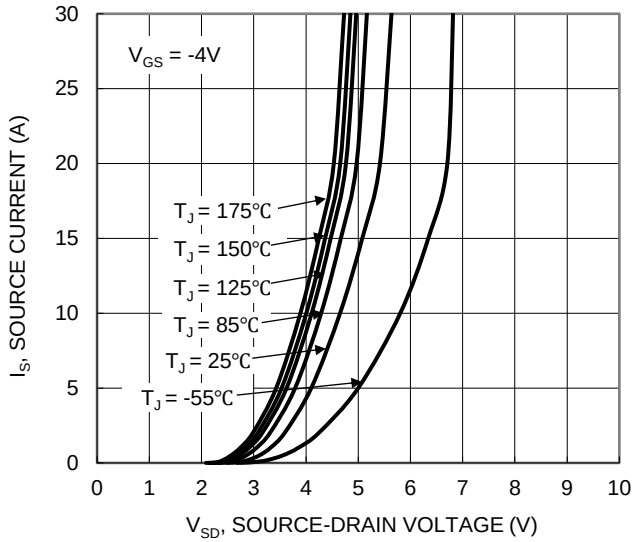


Figure 9. Diode Forward Voltage vs. Current

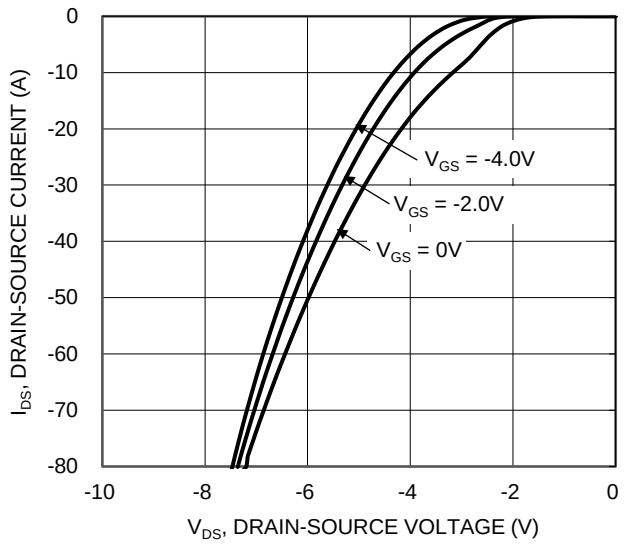


Figure 10. Body Diode Characteristic at 25°C

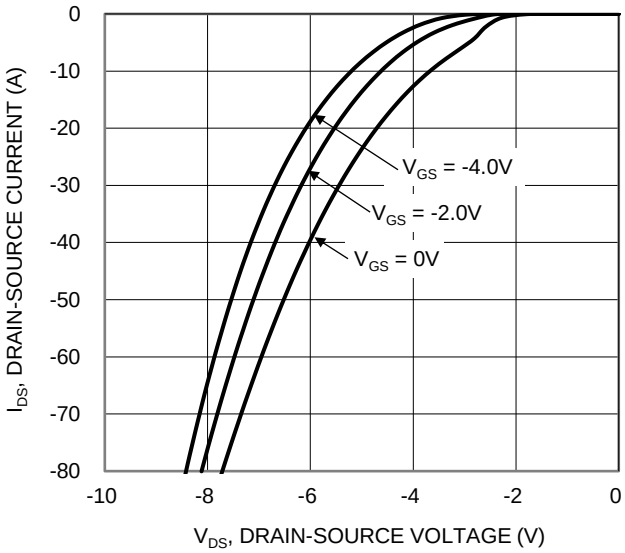


Figure 11. Body Diode Characteristic at -55°C

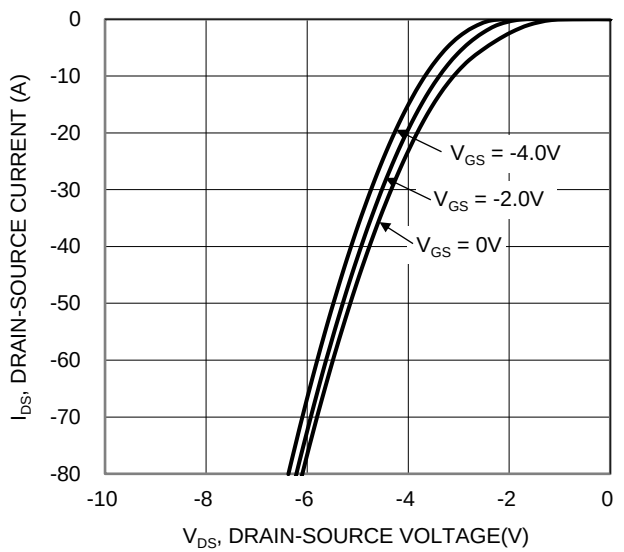


Figure 12. Body Diode Characteristic at 175°C

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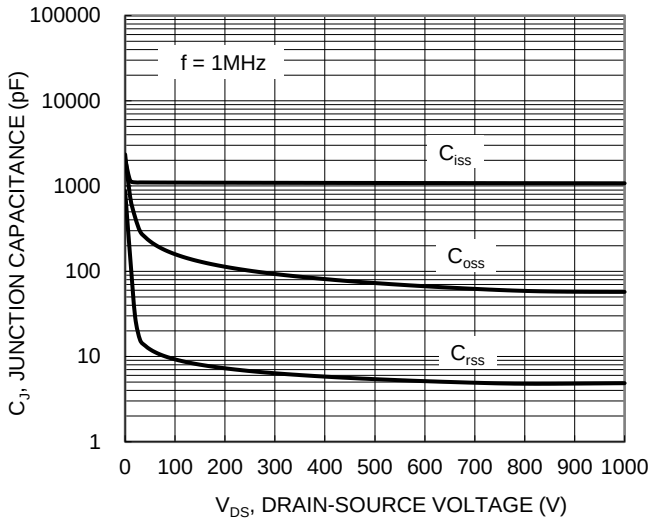


Figure 13. Typical Junction Capacitance

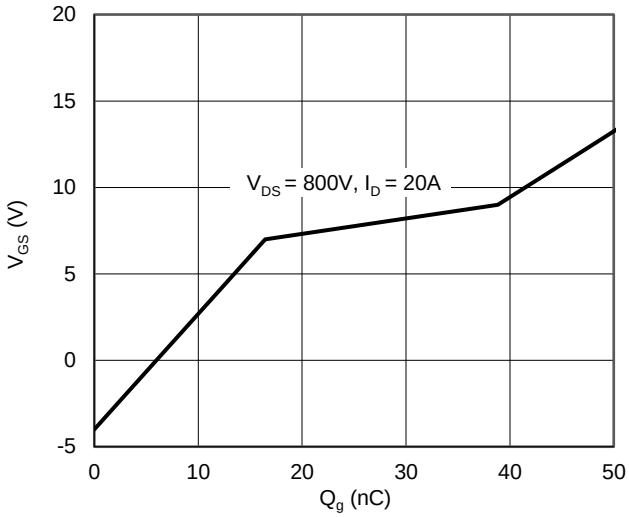


Figure 14. Gate Charge

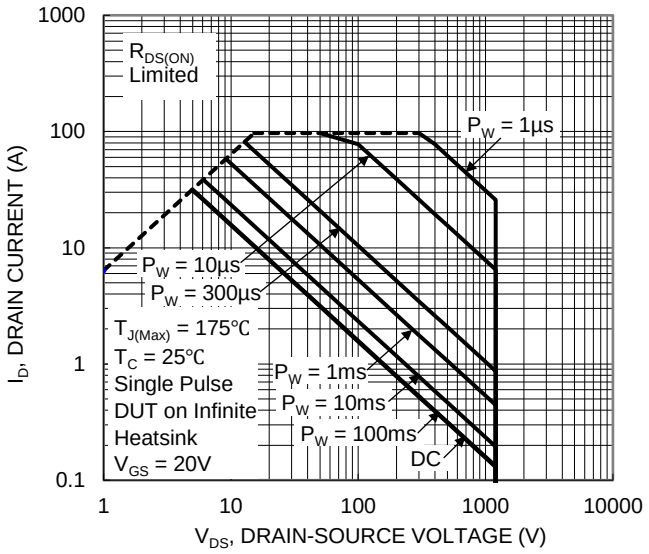


Figure 15. SOA, Safe Operation Area

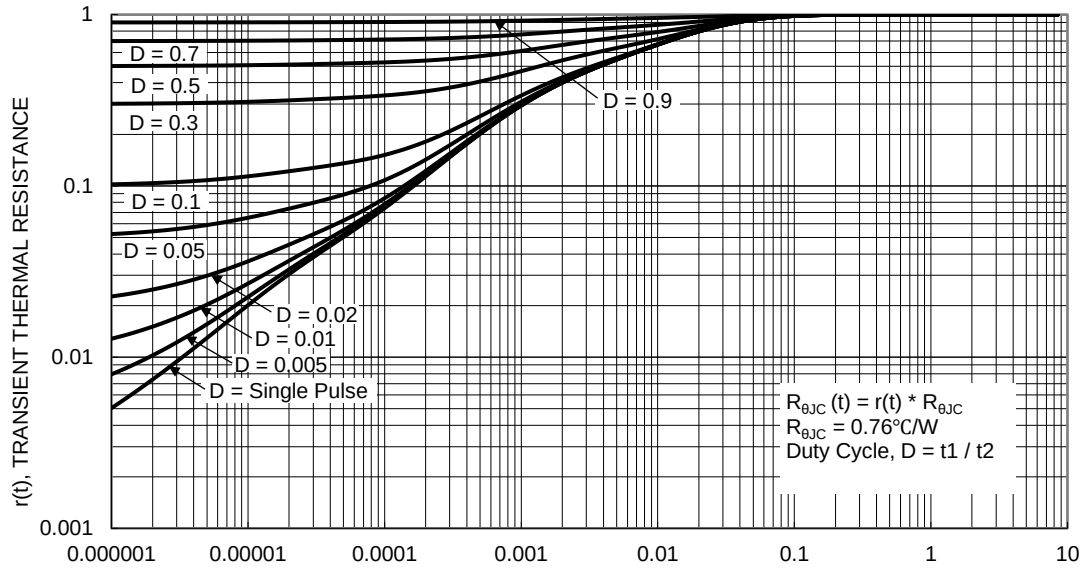


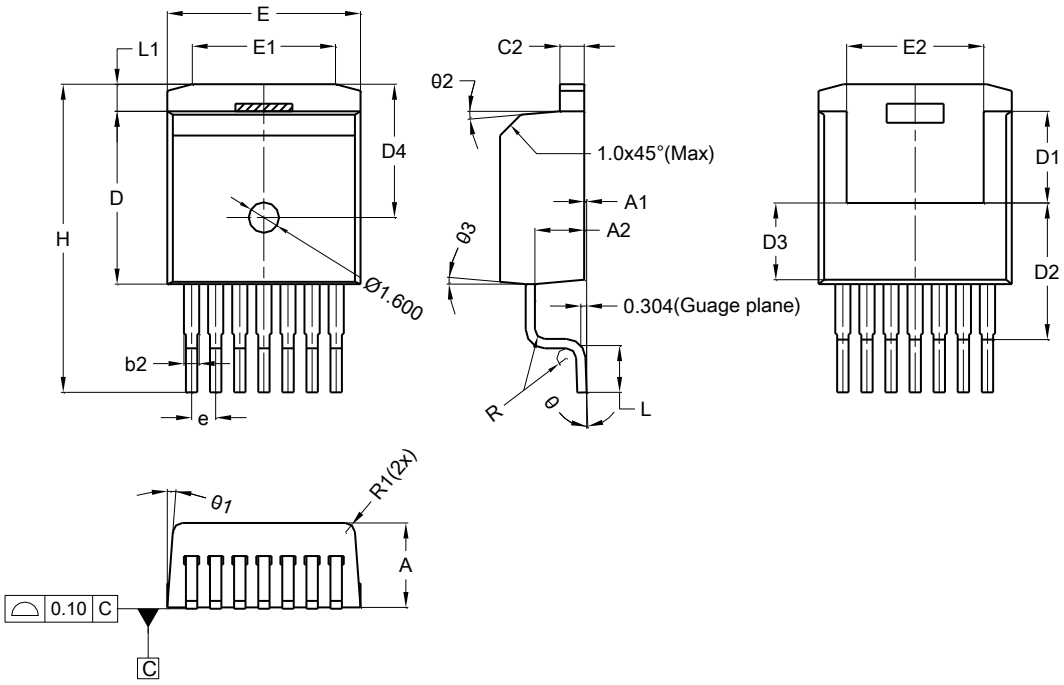
Figure 16. Transient Thermal Resistance

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Package Outline Dimensions

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

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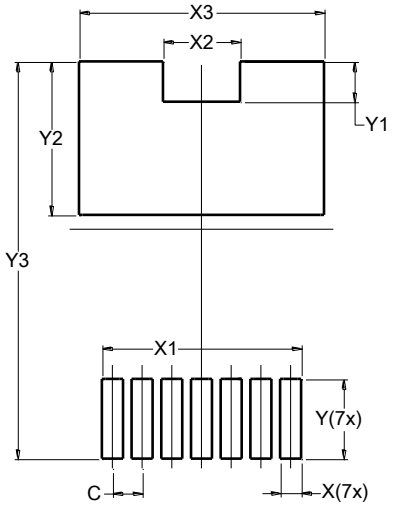


TO263-7			
Dim	**Min**	**Max**	**Typ**
A	4.30	4.570	4.435
A1	0.00	0.25	0.125
A2	2.595 REF		
b	0.500	0.700	0.600
b2	0.600	1.000	0.800
c	0.330	0.650	0.490
c2	1.170	1.400	1.285
D	9.025	9.125	9.075
D1	4.700	4.900	4.800
D2	7.170 REF		
D3	4.000 MIN		
D4	7.000 REF		
e	1.27 TYP		
E	10.130	10.230	10.180
E1	6.500	8.600	7.550
E2	6.778	7.665	7.223
H	15.043	17.313	16.178
L	2.324	2.700	2.512
L1	0.968	1.868	1.418
R	0.506 REF		
R1	0.500 REF		
θ	0°	8°	4°
θ1	4.5°	5.5°	5°
θ2	4°	6°	5°
θ3	4°	6°	5°
All Dimensions in mm			

Suggested Pad Layout

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

TO263-7



Dimensions	Value (in mm)
C	1.270
X	0.900
X1	8.520
X2	3.300
X3	10.480
Y	3.400
Y1	1.718
Y2	6.538
Y3	16.928

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