

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)**
- **An automotive-compliant part is available under separate datasheet ([DMWSH120H90SCT7Q](#))**

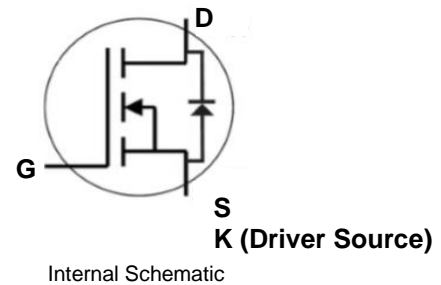
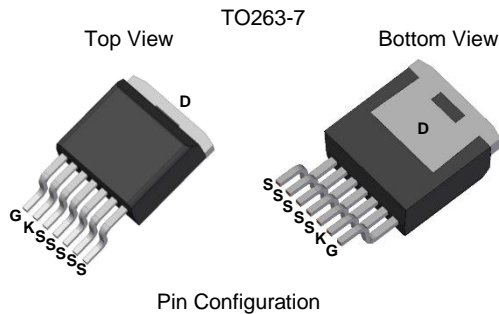
Description and Applications

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)

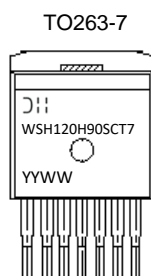


Ordering Information (Note 4)

| Part Number | Package | Packing | |
|--------------------|---------|---------|-------------|
| | | Qty. | Carrier |
| DMWSH120H90SCT7 | TO263-7 | 50 | Tube |
| DMWSH120H90SCT7-13 | 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



D = 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)

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

| Characteristic | Symbol | Value | Unit |
|--|------------------|-------------------------|------|
| Drain-Source Voltage | V _{DS} | 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) | I _D | T _C = +25°C | 38.2 |
| | | T _C = +100°C | 27.0 |
| 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) | P _D | T _C = +25°C | 197 |
| | | T _C = +100°C | 99 |
| Thermal Resistance, Junction to Ambient (Note 7) | R _{θJA} | 58.5 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | R _{θJC} | 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 _{DS} | 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 | g _{fs} | — | 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 _{riss} | — | 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:
- 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.

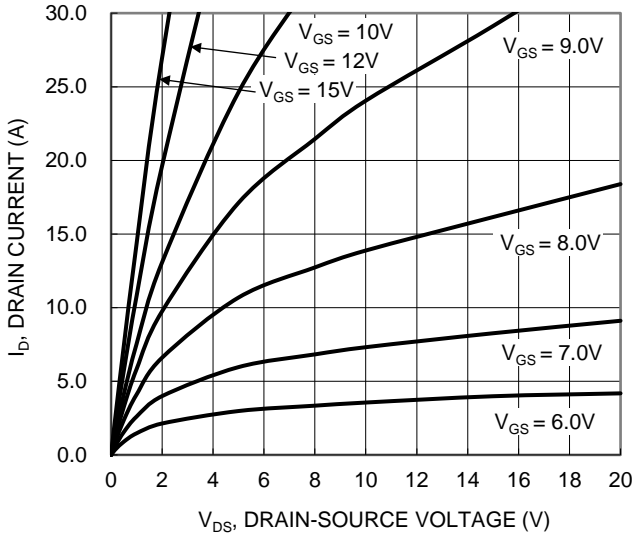


Figure 1. Typical Output Characteristic

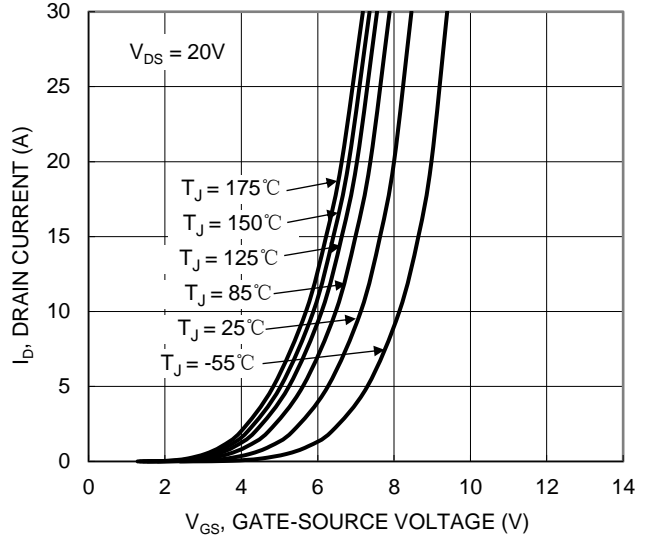


Figure 2. Typical Transfer Characteristic

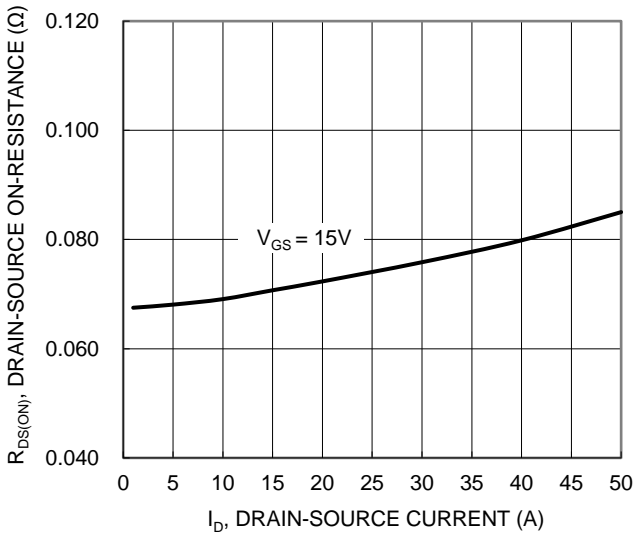


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

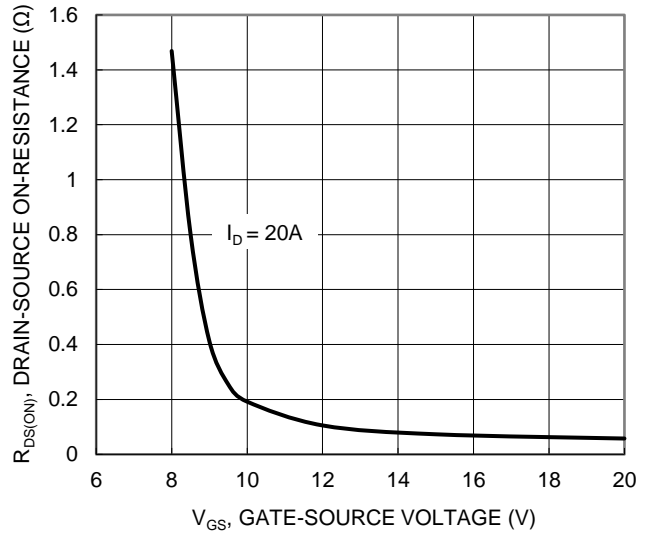


Figure 4. Typical Transfer Characteristic

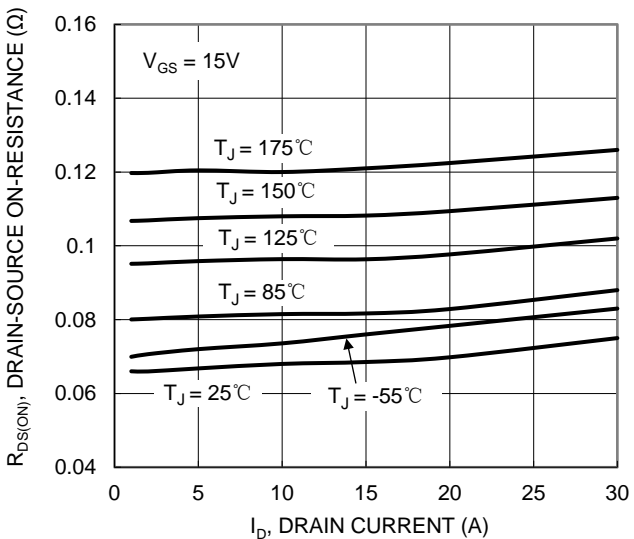


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

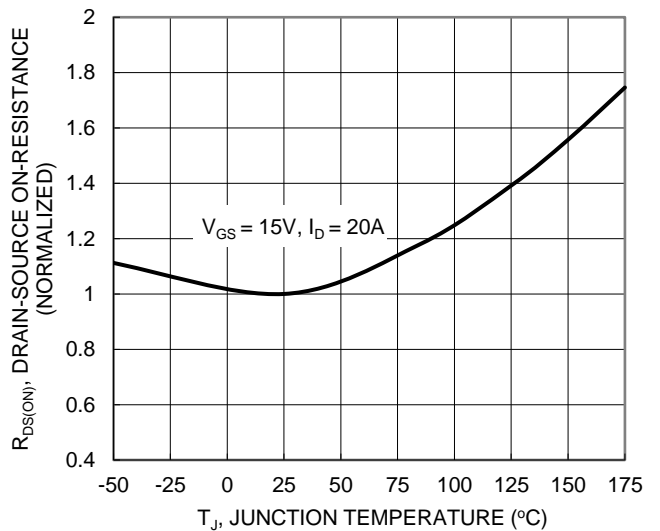


Figure 6. On-Resistance Variation with Junction Temperature

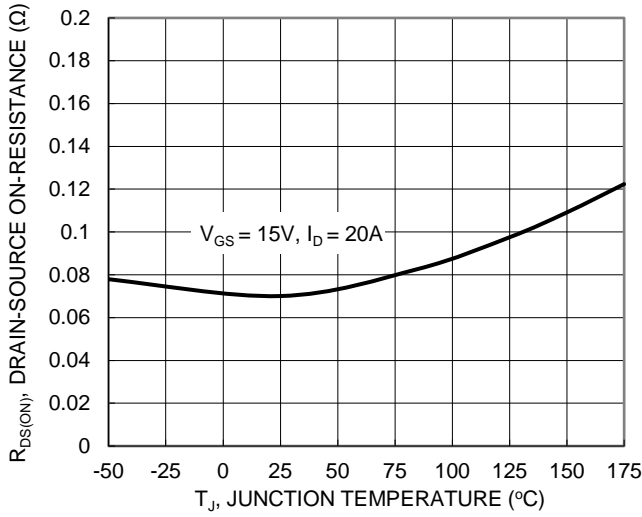


Figure 7. On-Resistance Variation with Junction Temperature

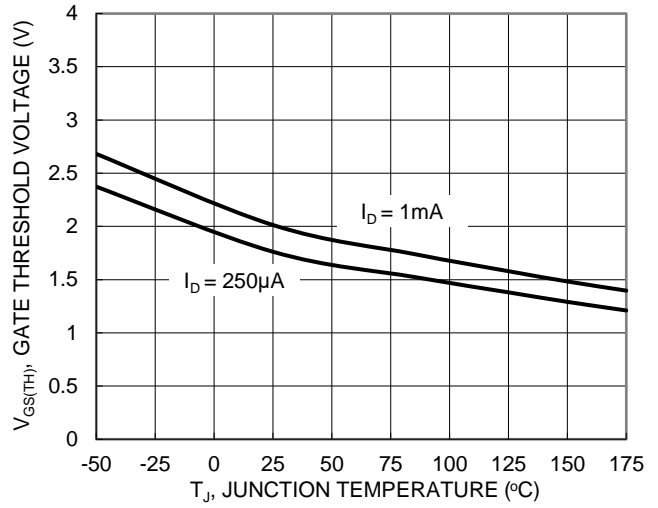


Figure 8. Gate Threshold Variation vs. Junction Temperature

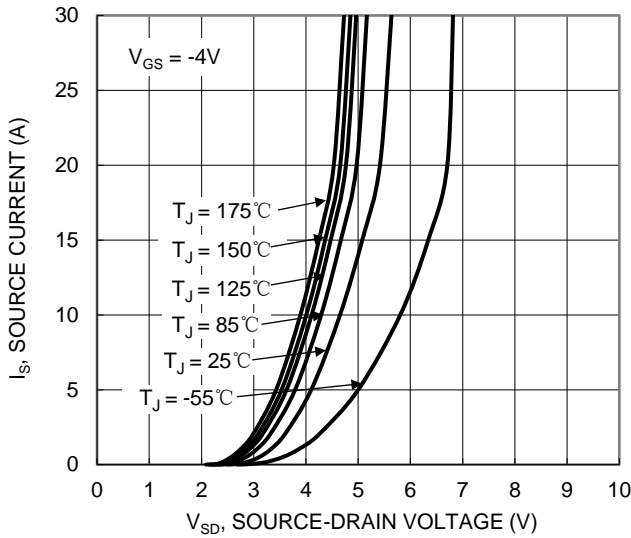


Figure 9. Diode Forward Voltage vs. Current

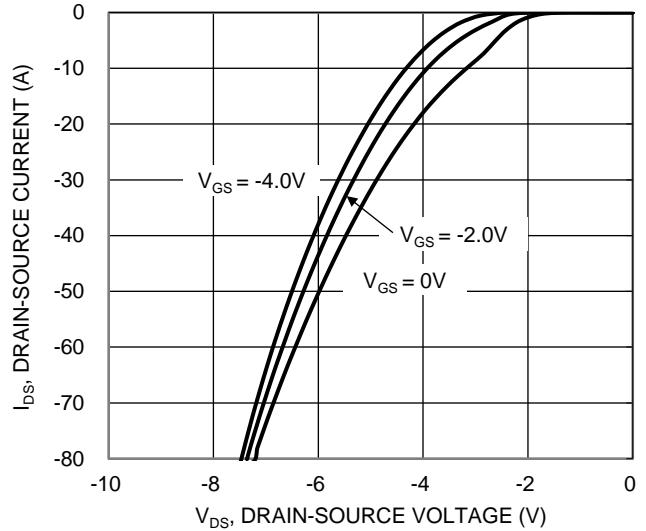


Figure 10. Body Diode Characteristic at 25°C

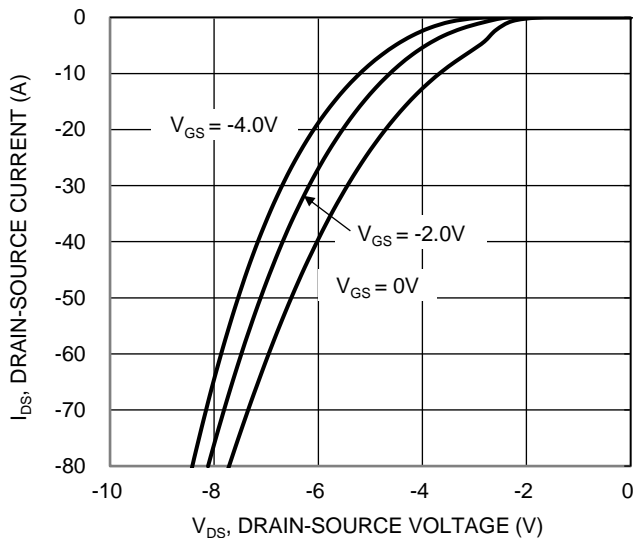


Figure 11. Body Diode Characteristic at -55°C

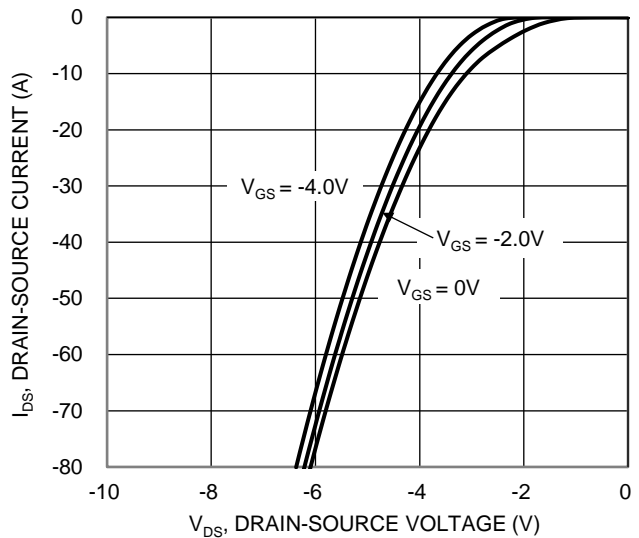


Figure 12. Body Diode Characteristic at 175°C

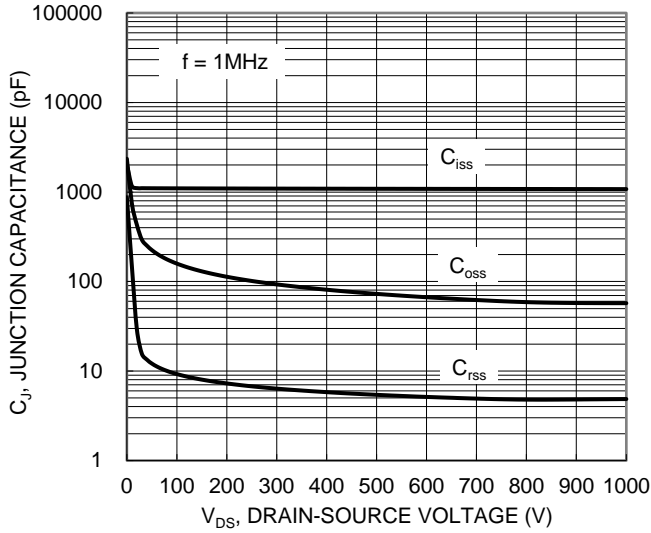


Figure 13. Typical Junction Capacitance

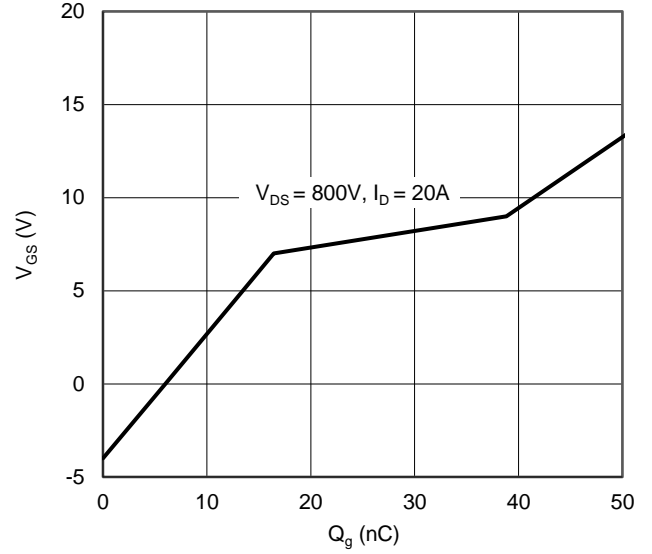


Figure 14. Gate Charge

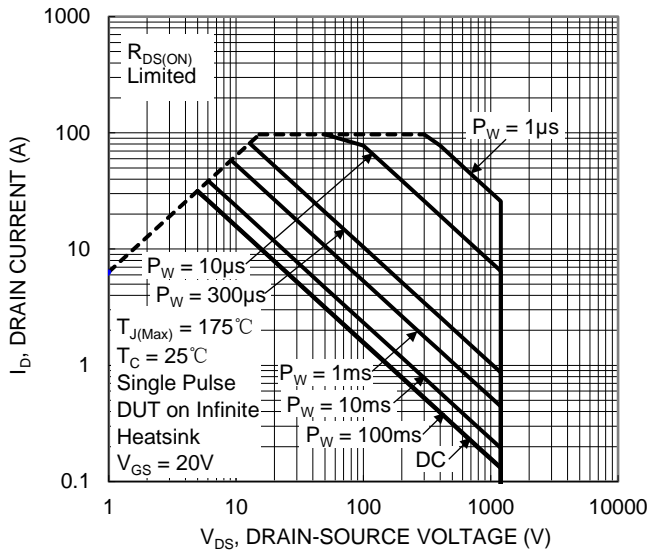


Figure 15. SOA, Safe Operation Area

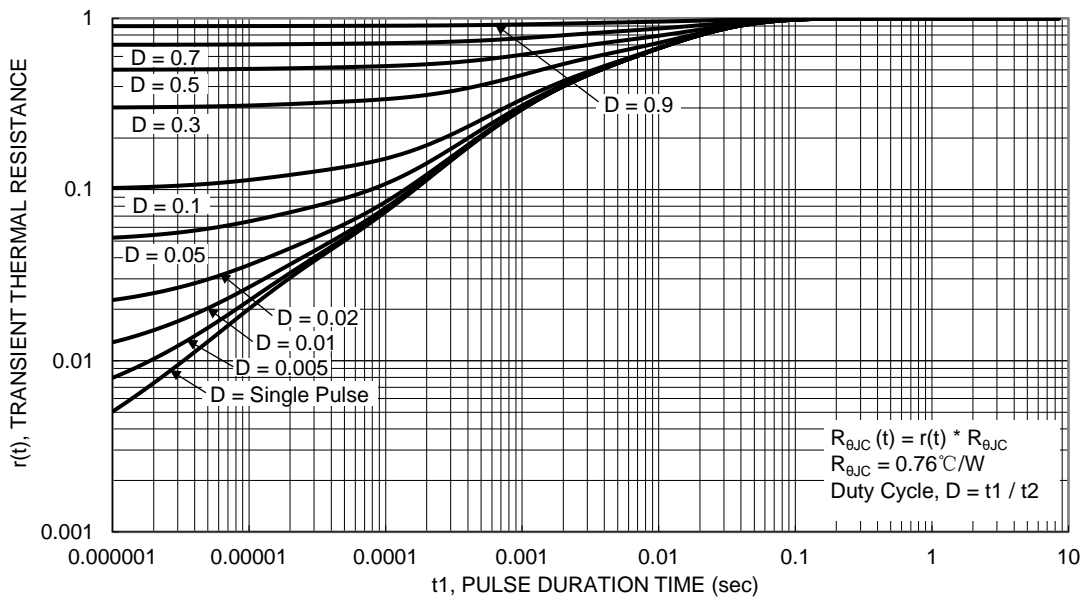
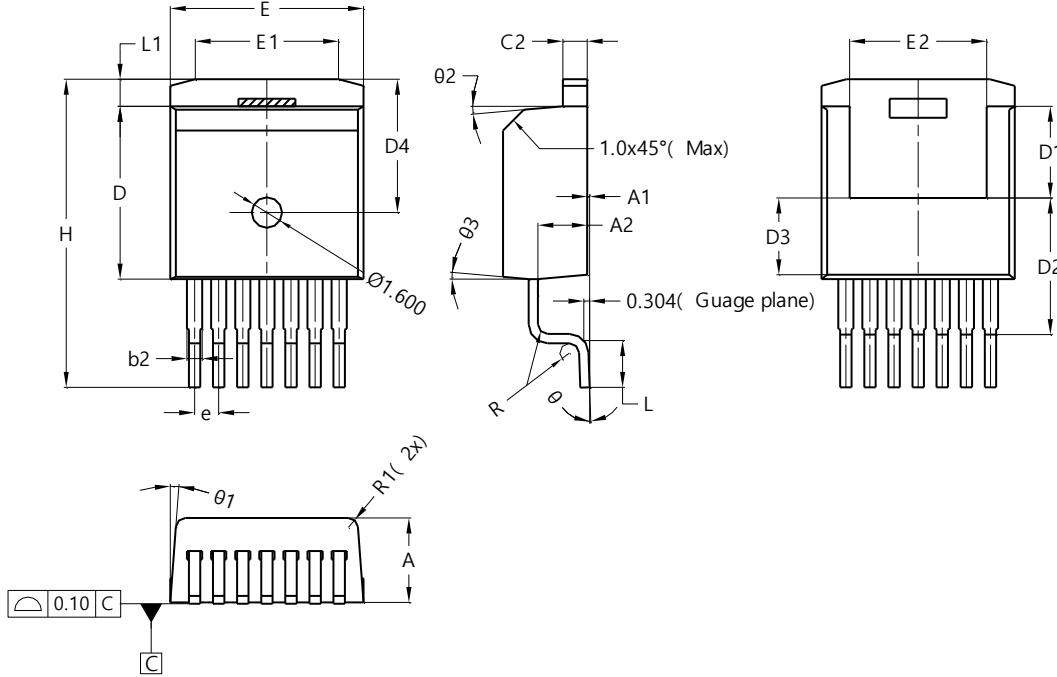


Figure 16. Transient Thermal Resistance

Package Outline Dimensions

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

TO263-7

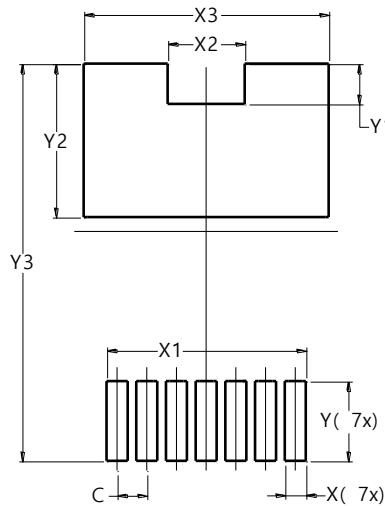


| TO263-7 | | | |
|----------------------|-----------|--------|--------|
| Dim | Min | Max | Typ |
| A | 4.30 | 4.570 | 4.435 |
| A1 | 0.00 | 0.25 | 0.125 |
| A2 | 2.595 REF | | |
| b | 0.500 | 0.700 | 0.600 |
| b2 | 0.600 | 1.000 | 0.800 |
| c | 0.330 | 0.650 | 0.490 |
| c2 | 1.170 | 1.400 | 1.285 |
| 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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[G3R40MT12J](#)