

## Product Summary

Device	BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
Q1 N-Channel	100V	220mΩ @ V <sub>GS</sub> = 10V	1.7A
		260mΩ @ V <sub>GS</sub> = 4.5V	1.6A
Q2 P-Channel	-100V	250mΩ @ V <sub>GS</sub> = -10V	-1.7A
		300mΩ @ V <sub>GS</sub> = -4.5V	-1.6A

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully 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-Q100/101/200, 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/>**

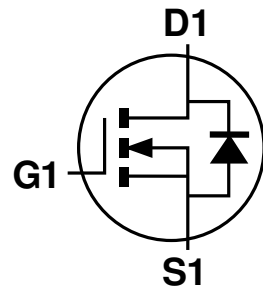
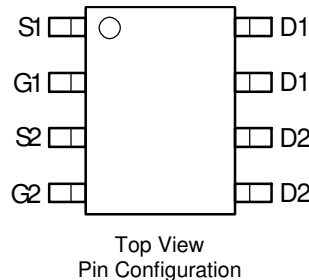
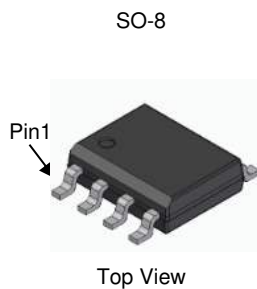
## Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

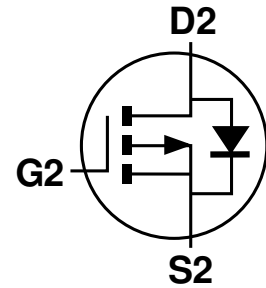
- DC-DC Converters
- Power Management Functions
- Backlighting

## Mechanical Data

- Package: SO-8
- 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 – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)



Q1 N-Channel MOSFET



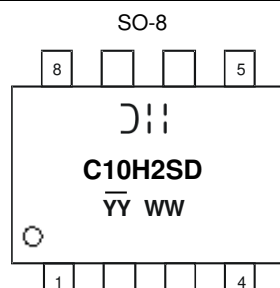
Q2 P-Channel MOSFET

## Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMC10H220LSD-13	SO-8	2,500	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  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



DII = Manufacturer's Marking  
 C10H2SD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 21 = 2021)  
 WW = Week (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Q1	Q2	Unit
Drain-Source Voltage			V <sub>DSS</sub>	100	-100	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	±20	V
Continuous Drain Current (Note 6) N-Channel: V <sub>GS</sub> = 10V P-Channel: V <sub>GS</sub> = -10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	1.7	-1.7	A
		T <sub>A</sub> = +70°C		1.4	-1.4	
Maximum Body Diode Forward Current (Note 6)			I <sub>S</sub>	1.7	-1.7	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	9	-13	A
Avalanche Current, L = 0.1mH			I <sub>AS</sub>	3.2	-11	A
Avalanche Energy, L = 0.1mH			E <sub>AS</sub>	0.5	6	mJ

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)			P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient (Note 5)		Steady State	R <sub>θJA</sub>	110	°C/W
Total Power Dissipation (Note 6)			P <sub>D</sub>	1.5	W
Thermal Resistance, Junction to Ambient (Note 6)		Steady State	R <sub>θJA</sub>	80	°C/W
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics N-Channel Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	170	220	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.6A
		—	210	260		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 1.3A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	340	—	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	18	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	12	—		
Gate Resistance	R <sub>g</sub>	—	2.1	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	4.1	—	nC	V <sub>DS</sub> = 50V, I <sub>D</sub> = 1.6A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	8.3	—		
Gate-Source Charge	Q <sub>gs</sub>	—	1.5	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	6.8	—	ns	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6.8Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>R</sub>	—	8.2	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	7.9	—		
Turn-Off Fall Time	t <sub>F</sub>	—	3.6	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	17	—	ns	I <sub>F</sub> = 1.1A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	9.8	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1 inch square copper plate.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

**Electrical Characteristics P-Channel Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -100V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.0	—	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	200	250	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -1A
		—	210	300		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.9	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	1030	—	pF	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	33	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	24	—		
Gate Resistance	R <sub>g</sub>	—	13	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	8.4	—	nC	V <sub>DS</sub> = -60V, I <sub>D</sub> = -1A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	17.5	—		
Gate-Source Charge	Q <sub>gs</sub>	—	2.8	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	3.2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	9.1	—	ns	V <sub>DD</sub> = -50V, R <sub>G</sub> = 9.1Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>R</sub>	—	14.9	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	57.4	—		
Turn-Off Fall Time	t <sub>F</sub>	—	34.4	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	25.2	—	ns	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	24.5	—	nC	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A, di/dt = 100A/μs

Notes: 7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

**N-Channel Q1**

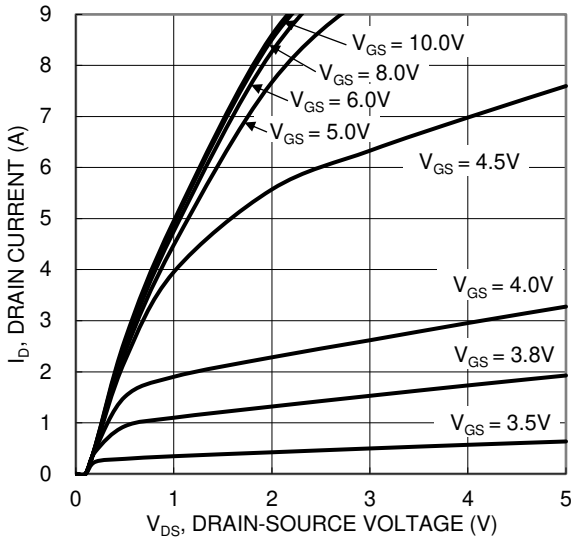


Figure 1. Typical Output Characteristic

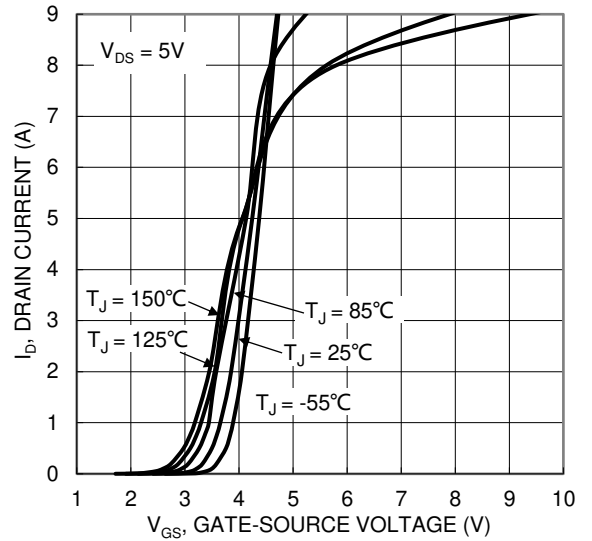


Figure 2. Typical Transfer Characteristic

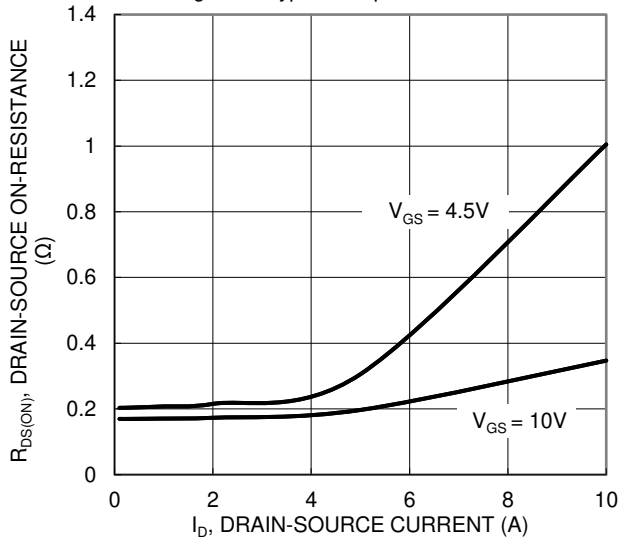


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

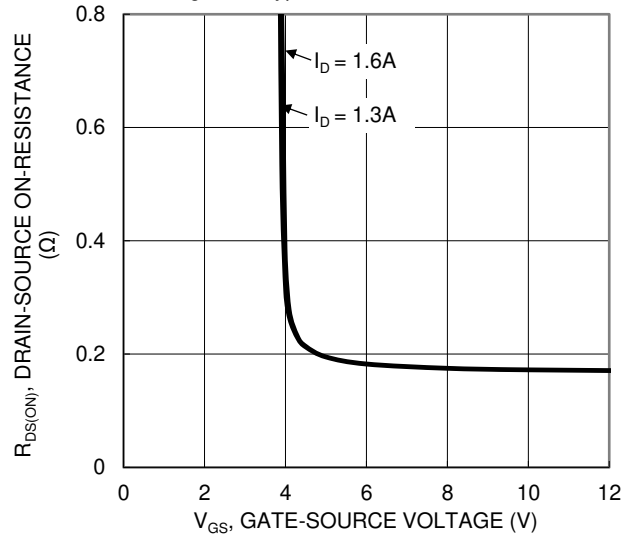


Figure 4. Typical Transfer Characteristic

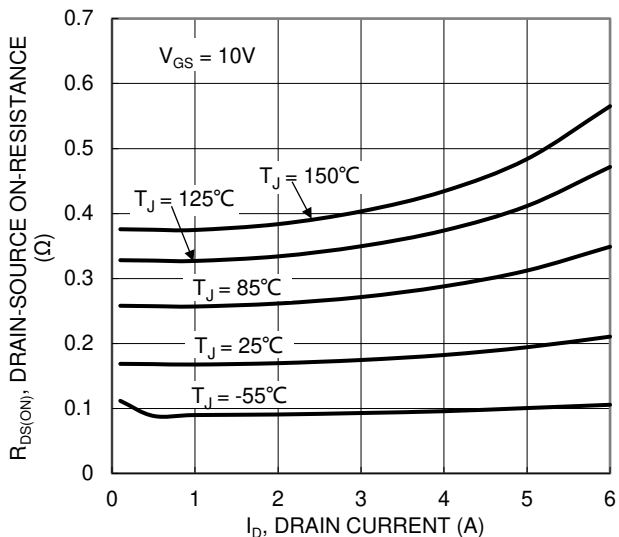


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

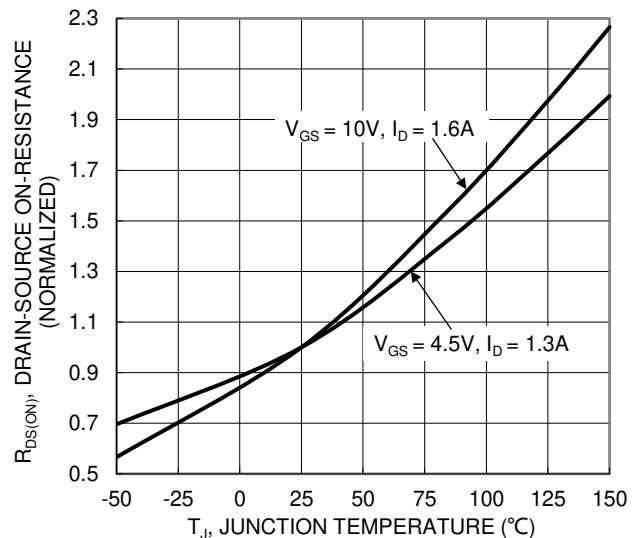


Figure 6. On-Resistance Variation with Temperature

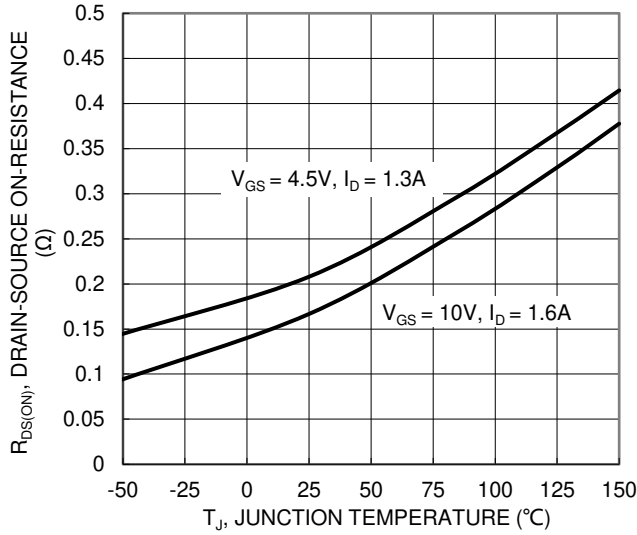


Figure 7. On-Resistance Variation with Temperature

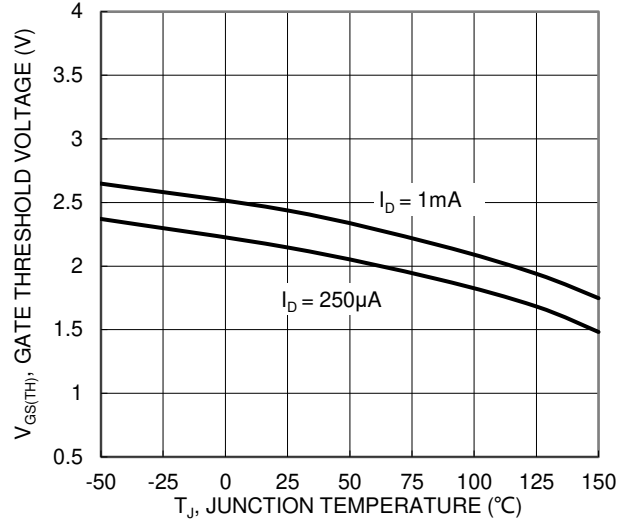


Figure 8. Gate Threshold Variation vs. Junction Temperature

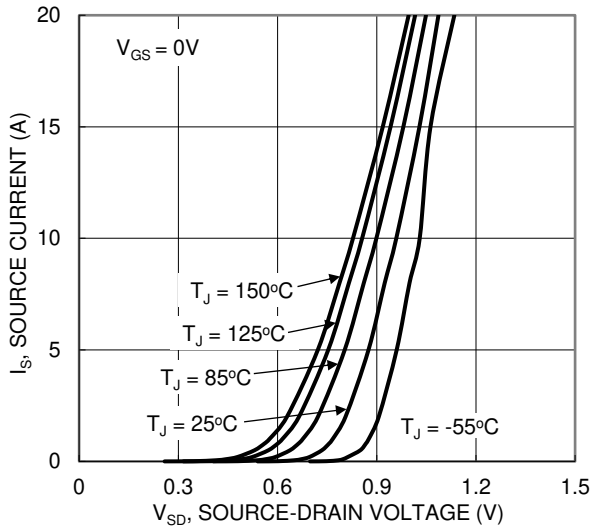


Figure 9. Diode Forward Voltage vs. Current

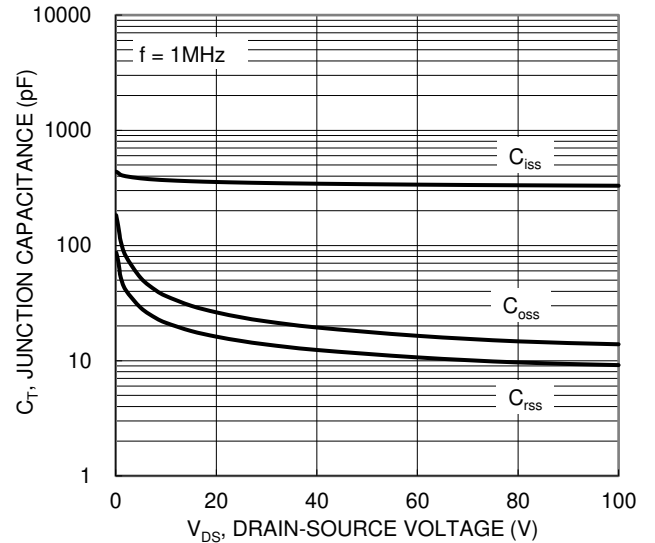


Figure 10. Typical Junction Capacitance

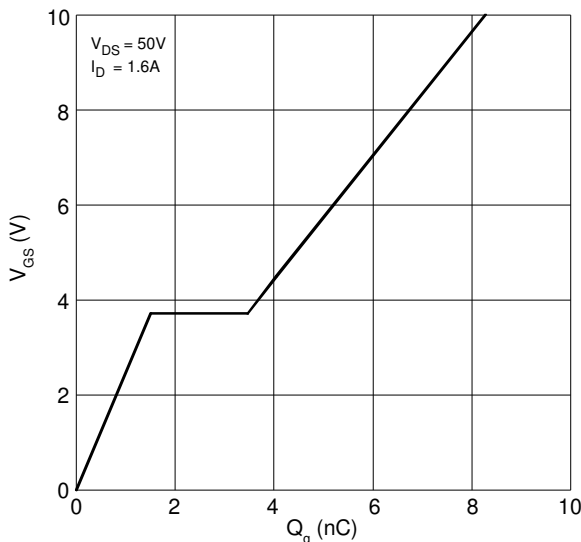


Figure 11. Gate Charge

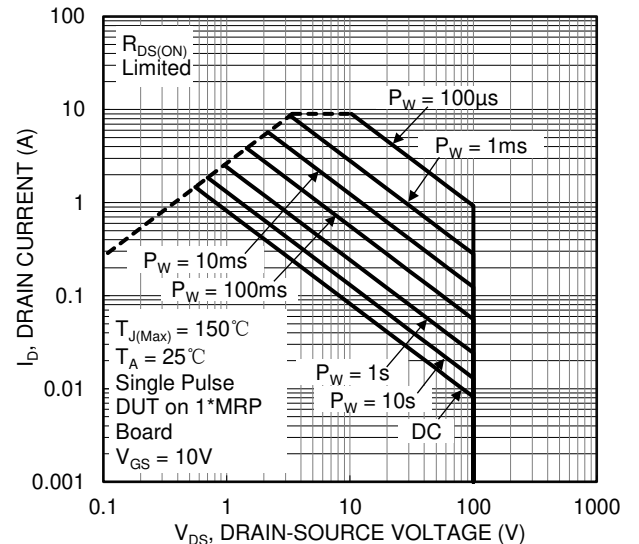


Figure 12. SOA, Safe Operation Area

**P-Channel Q2**

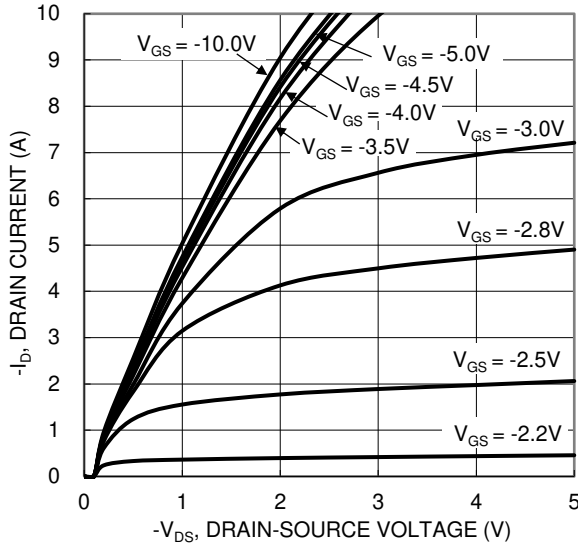


Figure 13. Typical Output Characteristic

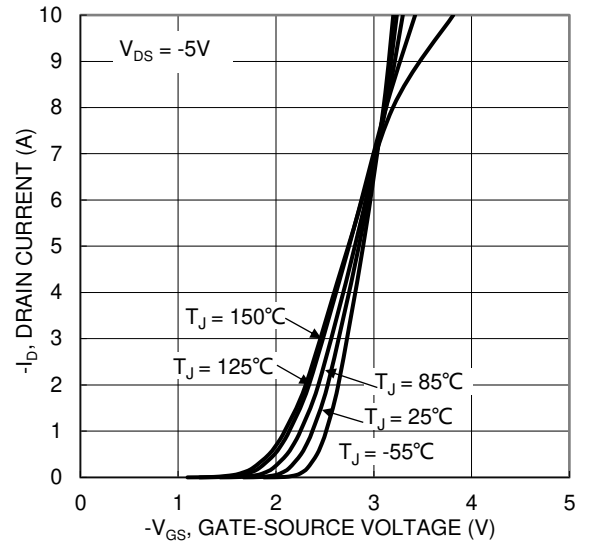


Figure 14. Typical Transfer Characteristic

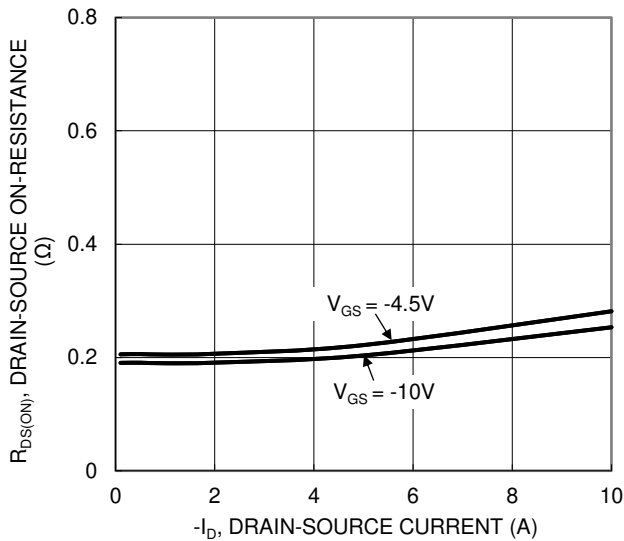


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

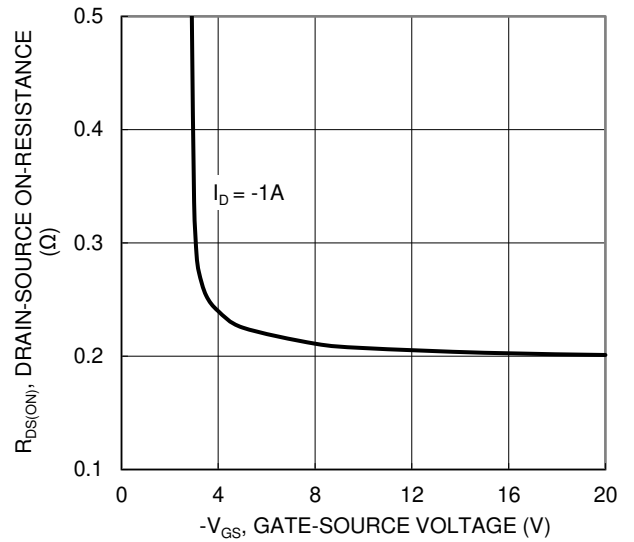


Figure 16. Typical Transfer Characteristic

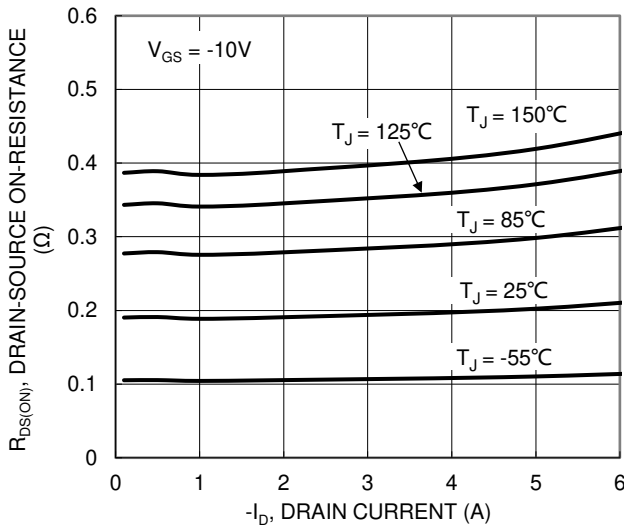


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

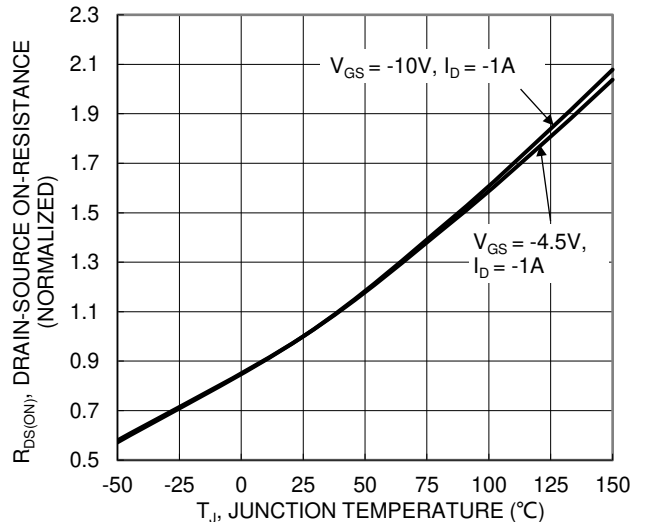
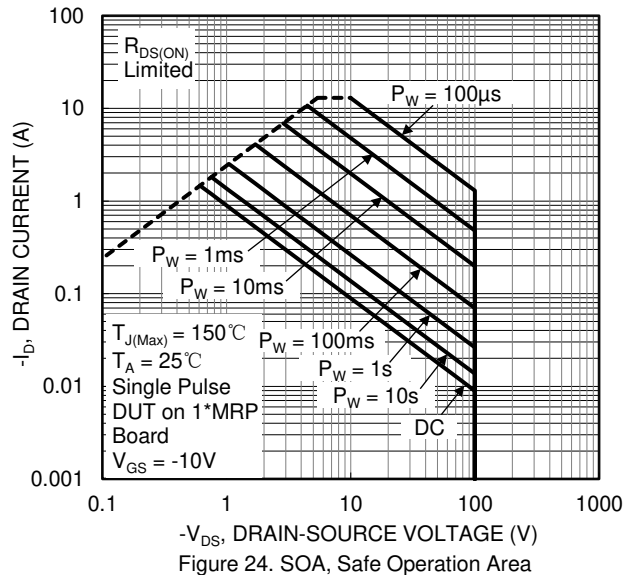
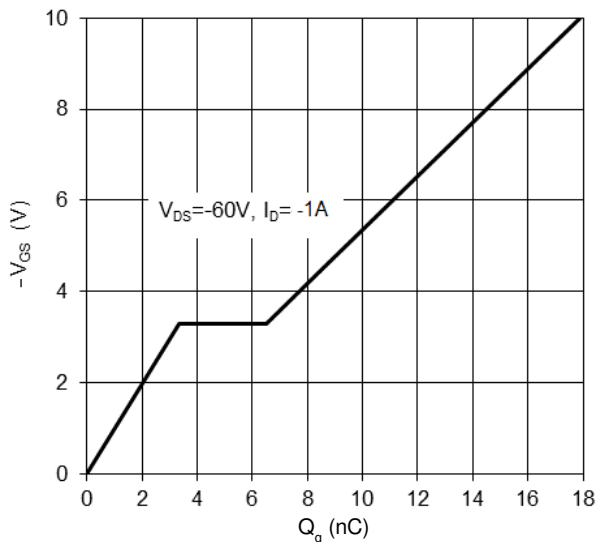
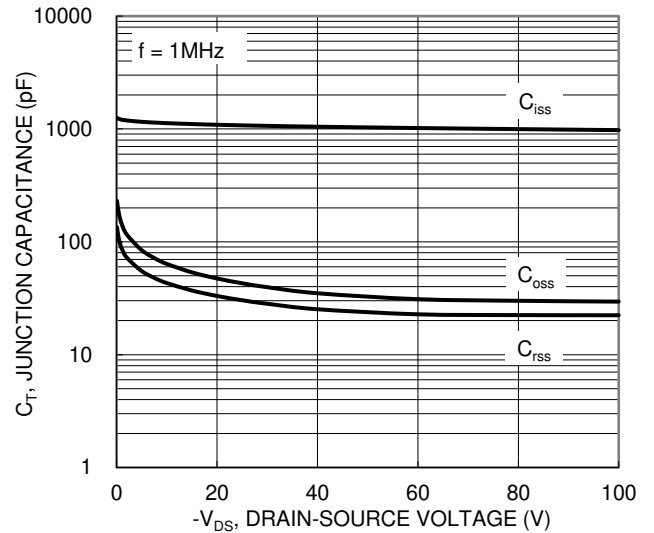
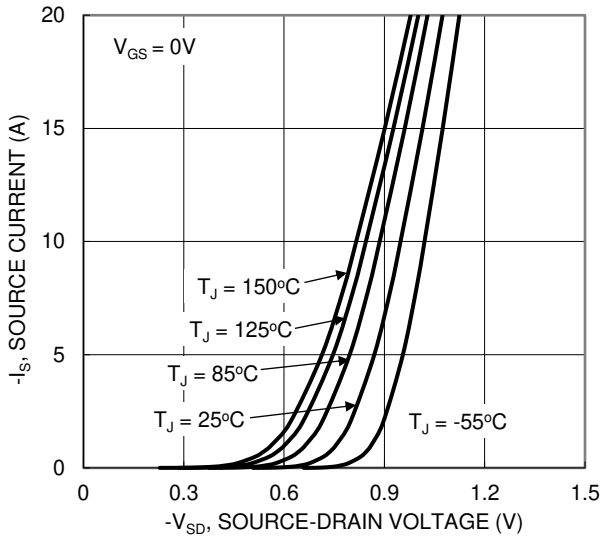
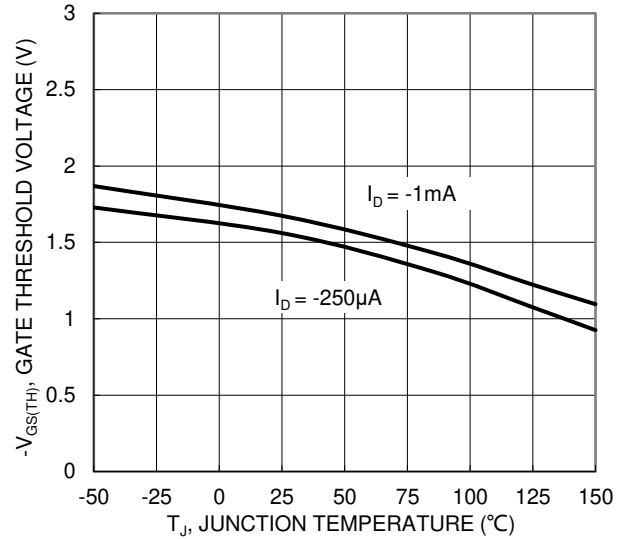
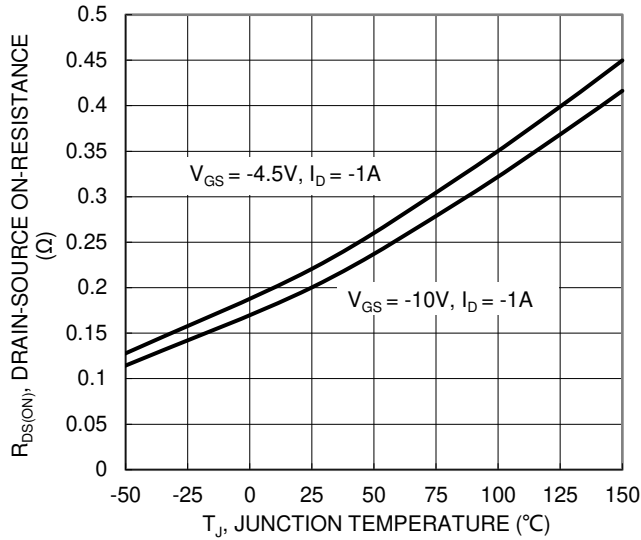


Figure 18. On-Resistance Variation with Temperature



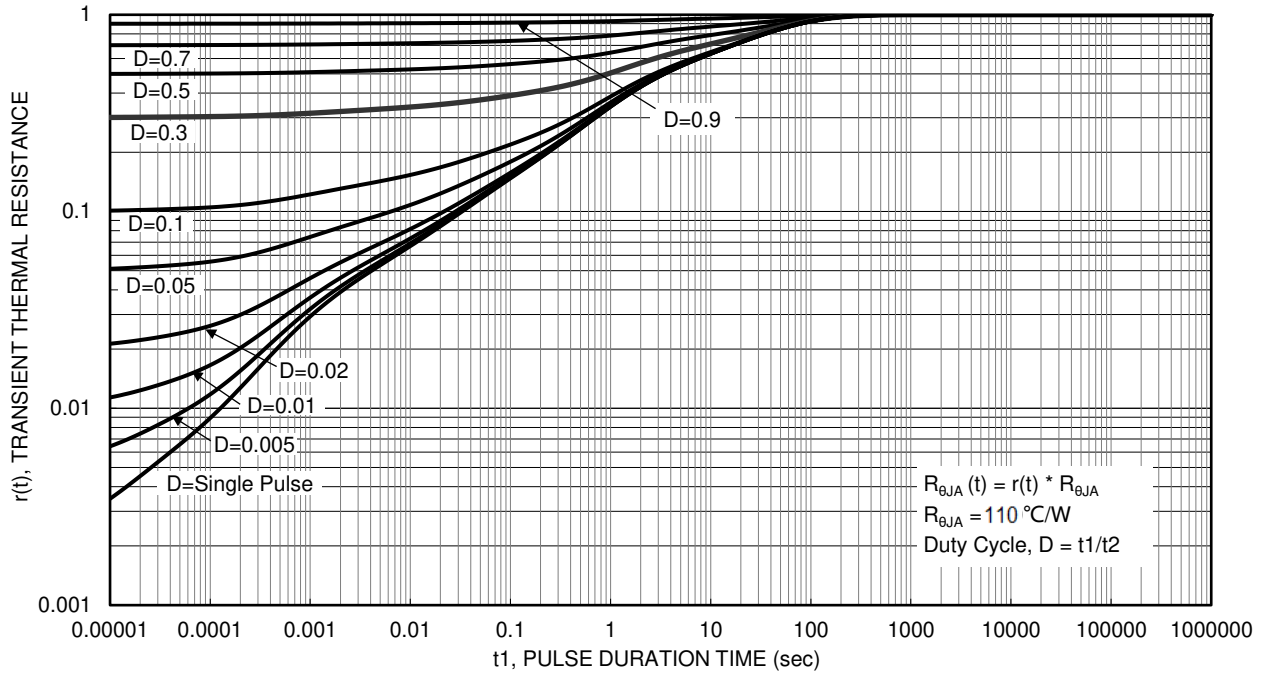


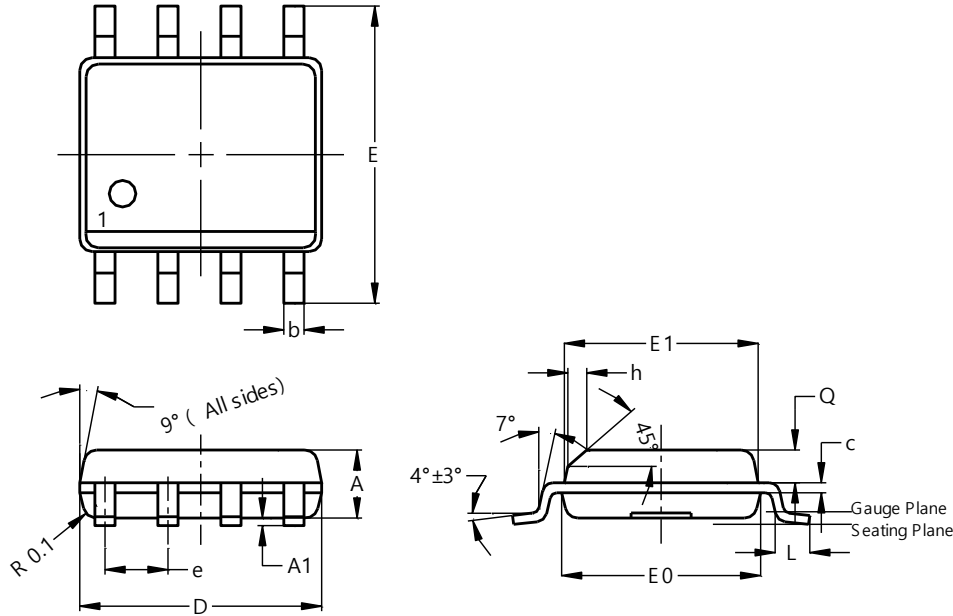
Figure 25. Transient Thermal Resistance



**Package Outline Dimensions**

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

SO-8

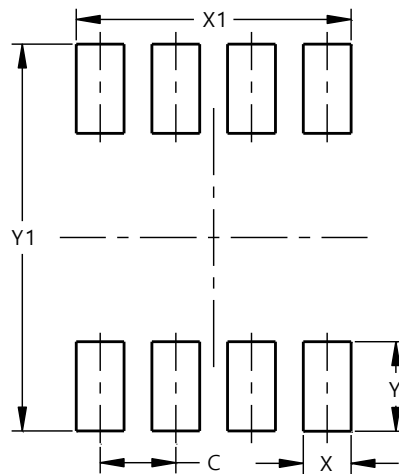


SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	--	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

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

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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