

## Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
Q1	20V	0.5Ω @ $V_{GS} = 4.5\text{V}$	1030mA
		0.9Ω @ $V_{GS} = 1.8\text{V}$	740mA
Q2	-20V	1.0Ω @ $V_{GS} = -4.5\text{V}$	-700mA
		2.0Ω @ $V_{GS} = -1.8\text{V}$	-460mA

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Applications

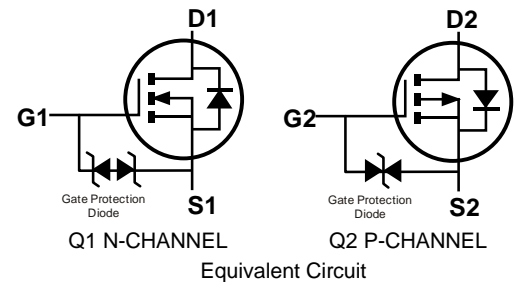
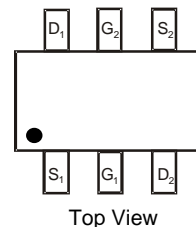
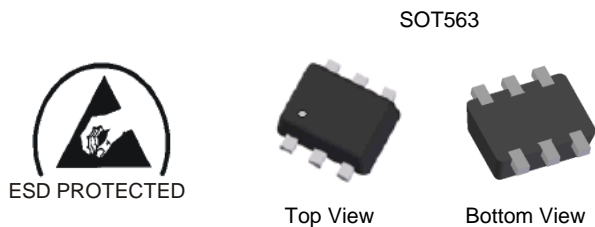
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Load Switch

## Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage  $V_{GS(th)} < 1\text{V}$
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Ultra-Small Surface Mount Package
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: SOT563
- Case 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: 0.003 grams (Approximate)

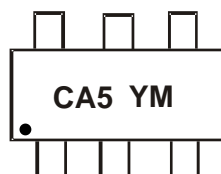


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2450UV-7	SOT563	3,000/Tape & Reel
DMC2450UV-13	SOT563	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

## Marking Information



CA5 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021
Code	C	D	E	F	G	H	I

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings - Q1 N-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	1,030 800	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	1,150 900	mA
Continuous Drain Current (Note 6) V <sub>GS</sub> = 1.8V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	740 570	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	870 700	mA
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	3	A
Maximum Body Diode Continuous Current			I <sub>S</sub>	800	mA

**Maximum Ratings - Q2 P-CHANNEL** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-700 -550	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-820 -640	mA
Continuous Drain Current (Note 6) V <sub>GS</sub> = -1.8V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-460 -350	mA
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-550 -420	mA
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-2	A
Maximum Body Diode Continuous Current			I <sub>S</sub>	-800	mA

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P <sub>D</sub>	0.45	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R <sub>θJA</sub>	281	°C/W
	t < 10s		210	°C/W
Total Power Dissipation (Note 6)		P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R <sub>θJA</sub>	129	°C/W
	t < 10s		97	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

**Electrical Characteristics - Q1 N-CHANNEL** (@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>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	100	nA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±1.0	µA	V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V
		—	—	±10.0		V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	—	0.9	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.3	0.48	Ω	V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 200mA
		—	0.35	0.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 200mA
		—	0.45	0.7		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 200mA
		—	0.55	0.9		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA
		—	0.65	1.5		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 50mA
		—	2	—		V <sub>GS</sub> = 1.2V, I <sub>D</sub> = 1mA
		—	—	—		—
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 500mA,
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iSS</sub>	—	37.1	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oSS</sub>	—	6.5	—		
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	4.8	—		
Gate Resistance	R <sub>g</sub>	—	68	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V,
Total Gate Charge	Q <sub>g</sub>	—	0.5	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.07	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.1	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	4.06	—	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω, I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>r</sub>	—	7.28	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	13.74	—		
Turn-Off Fall Time	t <sub>f</sub>	—	10.54	—		

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

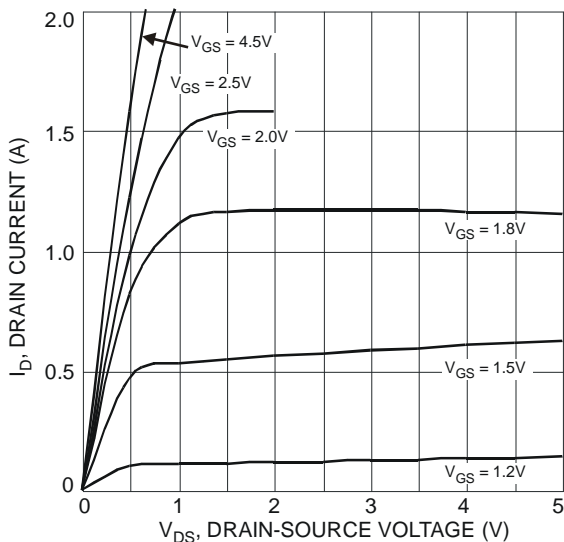


Fig. 1 Typical Output Characteristics

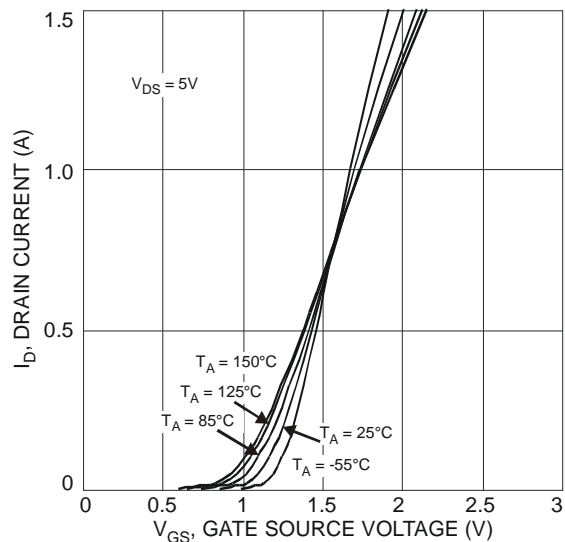


Fig. 2 Typical Transfer Characteristics

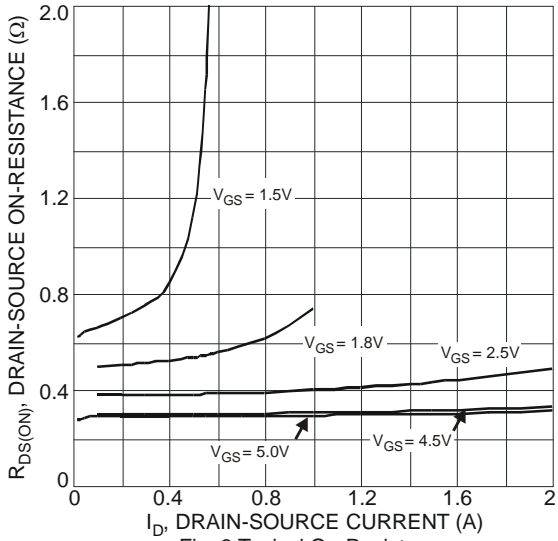


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

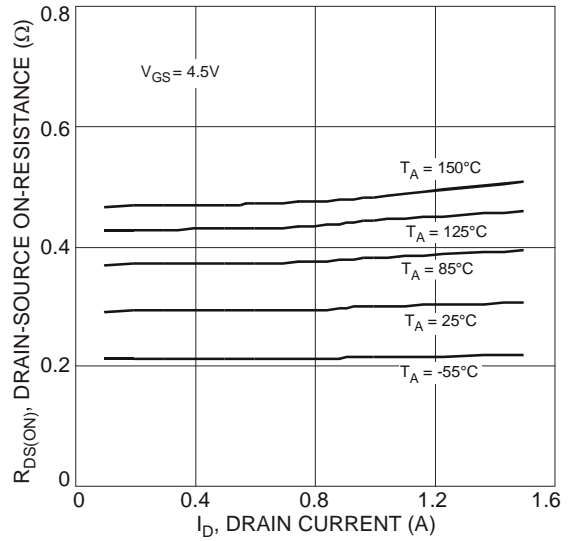


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

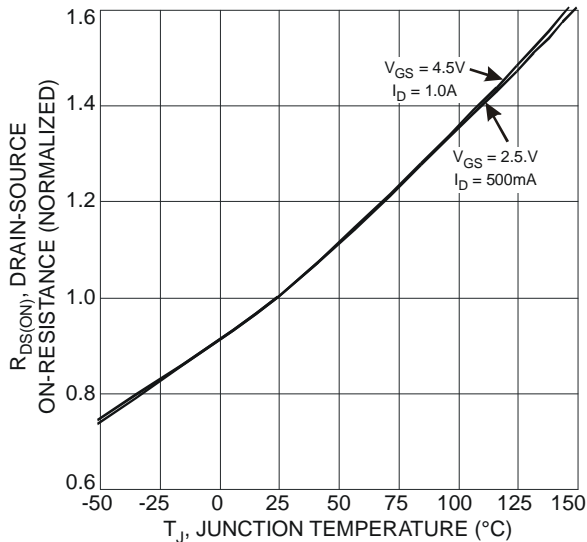


Fig. 5 On-Resistance Variation with Temperature

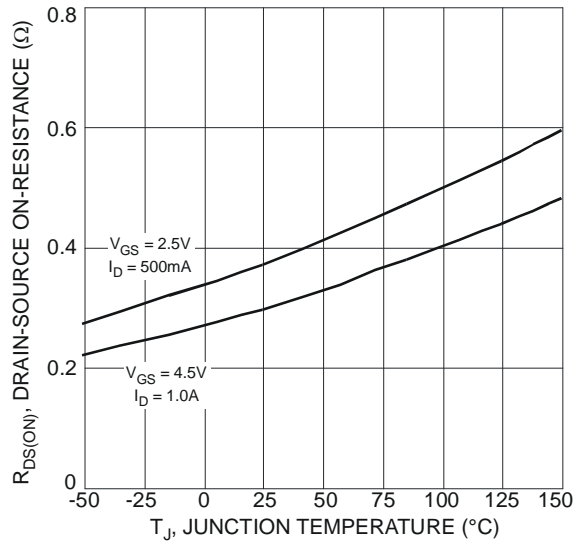


Fig. 6 On-Resistance Variation with Temperature

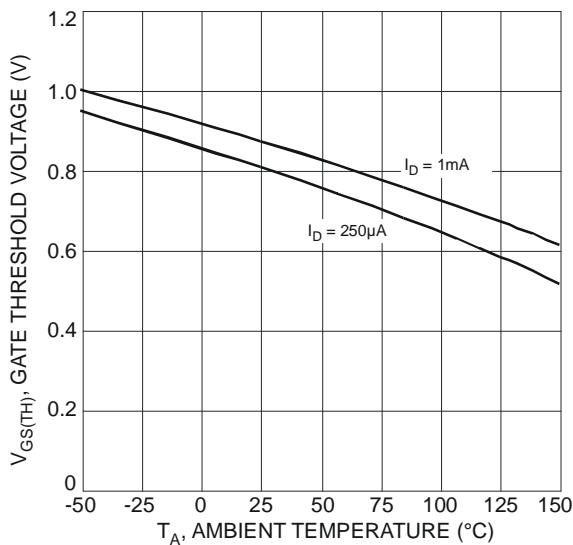


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

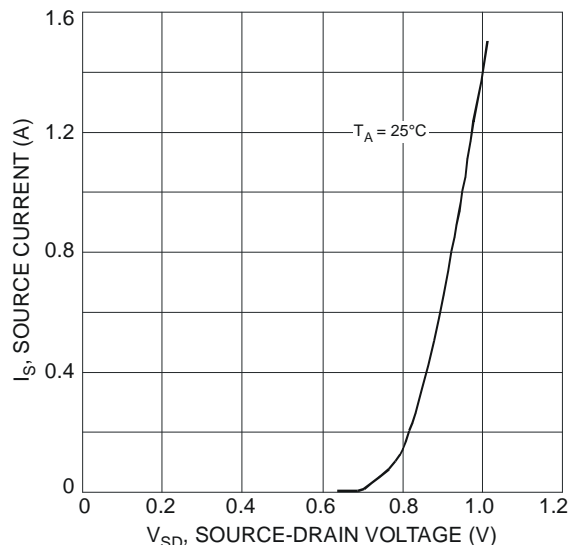
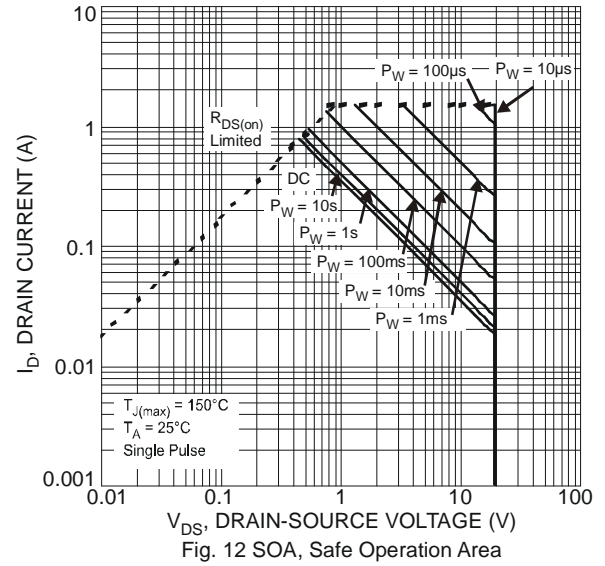
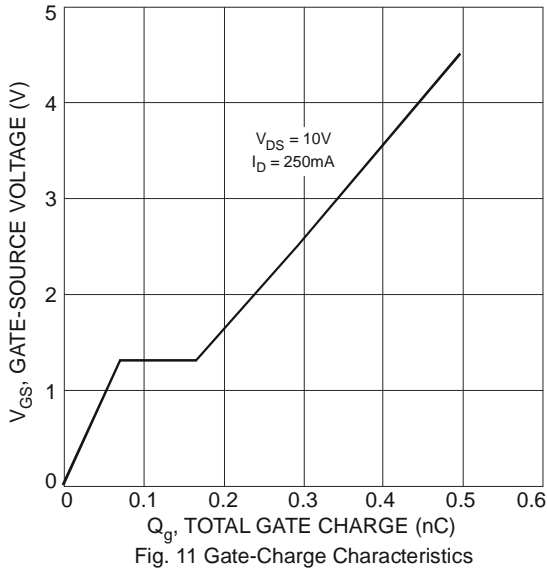
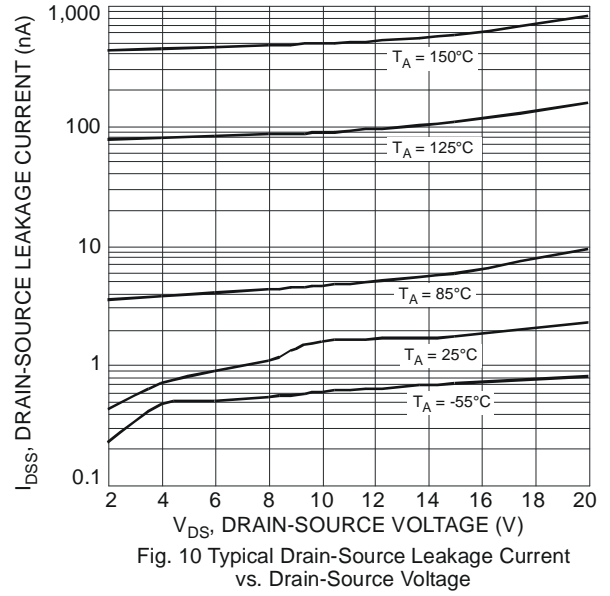
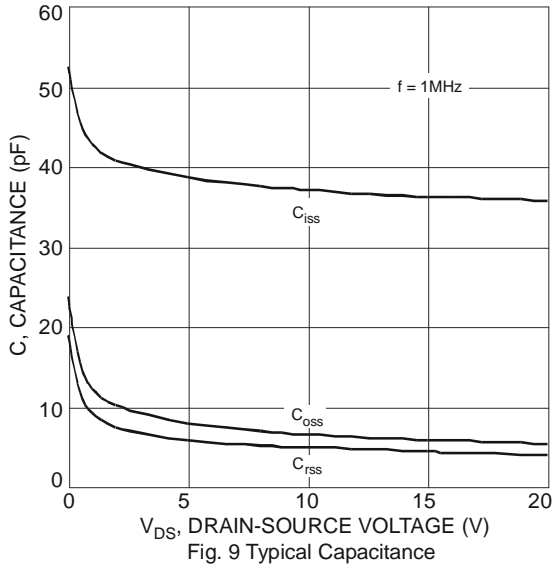


Fig. 8 Diode Forward Voltage vs. Current



**Electrical Characteristics - Q2 P-CHANNEL** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-20	—	—	V	$V_{GS} = 0V, I_D = -1mA$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	-100	nA	$V_{DS} = -20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 5V, V_{DS} = 0V$
		—	—	$\pm 10.0$		$V_{GS} = \pm 8V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.5	—	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	0.67	0.97	$\Omega$	$V_{GS} = -5V, I_D = -100mA$
		—	0.7	1.0		$V_{GS} = -4.5V, I_D = -100mA$
		—	0.9	1.5		$V_{GS} = -2.5V, I_D = -80mA$
		—	1.2	2.0		$V_{GS} = -1.8V, I_D = -40mA$
		—	1.5	3.0		$V_{GS} = -1.5V, I_D = -30mA$
		—	5	—		$V_{GS} = -1.2V, I_D = -1mA$
Diode Forward Voltage	$V_{SD}$	—	-0.75	-1.2	V	$V_{GS} = 0V, I_S = -330mA$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	—	46.1	—	pF	$V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz$
Output Capacitance	$C_{oss}$	—	7.2	—		
Reverse Transfer Capacitance	$C_{rss}$	—	4.9	—		
Gate Resistance	$R_g$	—	14.3	—	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V,$
Total Gate Charge $V_{GS} = -4.5V$	$Q_g$	—	0.5	—	nC	$V_{DS} = -10V, I_D = -250mA$
Total Gate Charge $V_{GS} = -10V$	$Q_g$	—	0.85	—		
Gate-Source Charge	$Q_{gs}$	—	0.09	—		
Gate-Drain Charge	$Q_{gd}$	—	0.09	—		
Turn-On Delay Time	$t_{D(on)}$	—	8.5	—	ns	$V_{DD} = -3V, V_{GS} = -2.5V, R_L = 300\Omega, R_G = 25\Omega, I_D = -100mA$
Turn-On Rise Time	$t_r$	—	4.3	—		
Turn-Off Delay Time	$t_{D(off)}$	—	20.2	—		
Turn-Off Fall Time	$t_f$	—	19.2	—		

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

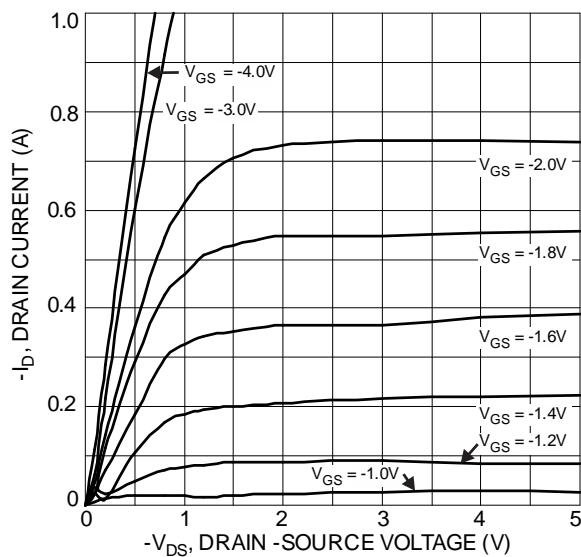


Fig. 13 Typical Output Characteristics

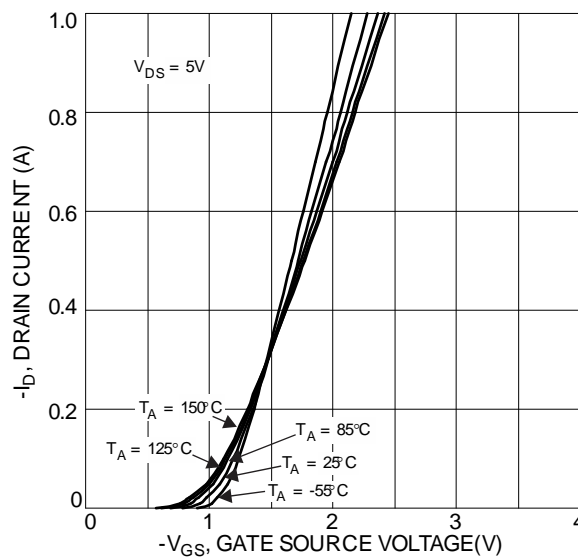


Fig. 14 Typical Transfer Characteristics

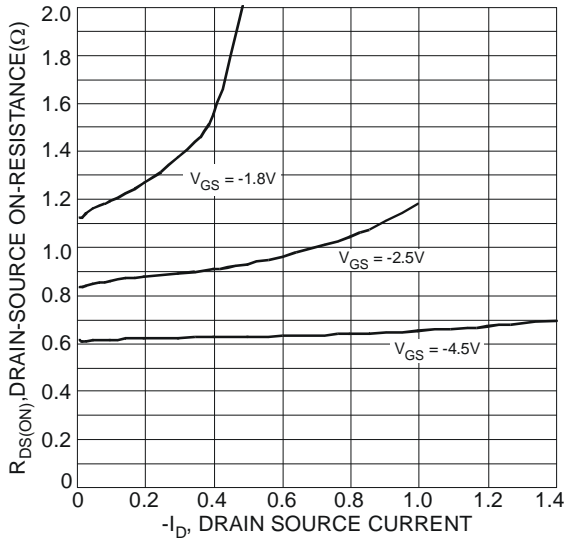


Fig. 15 Typical On-Resistance vs. Drain Current and Gate Voltage

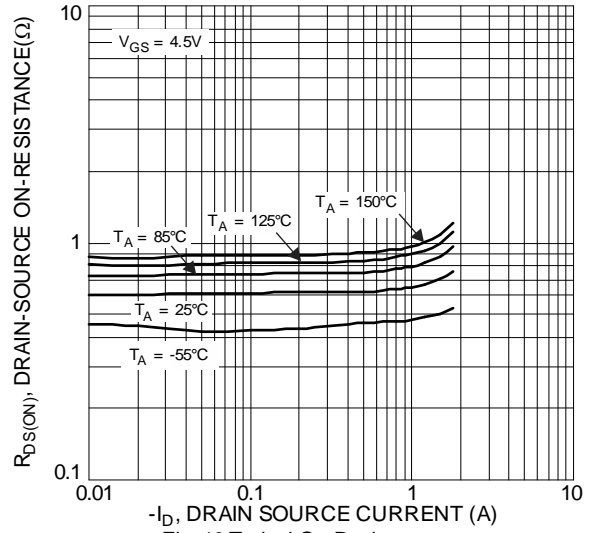


Fig. 16 Typical On-Resistance vs. Drain Current and Temperature

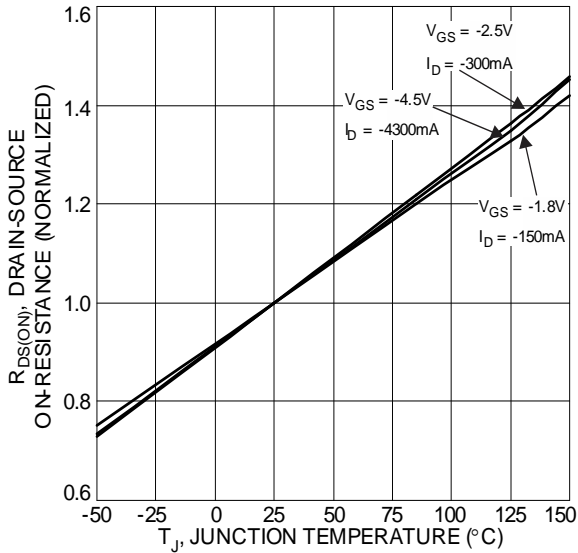


Fig. 17 On-Resistance Variation with Temperature

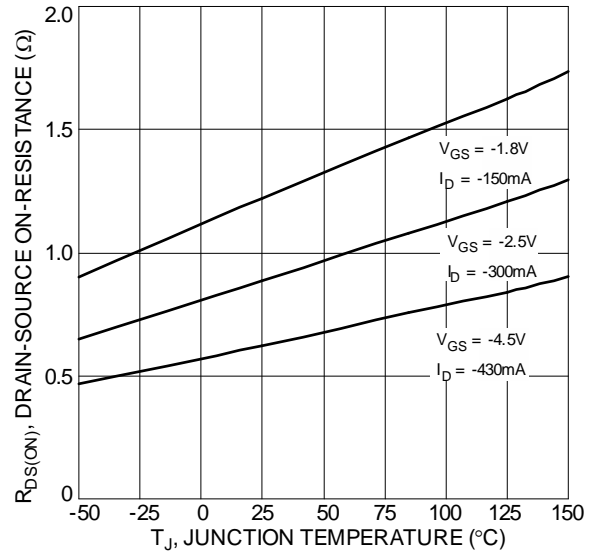


Fig. 18 On-Resistance vs. Temperature

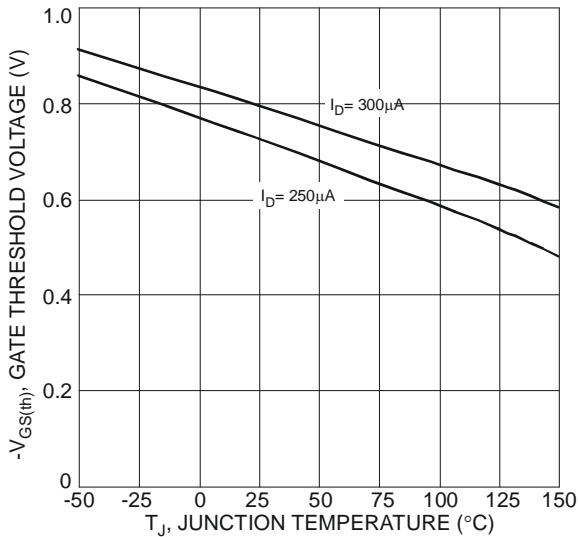


Fig. 19 Gate Threshold Variation vs. Ambient Temperature

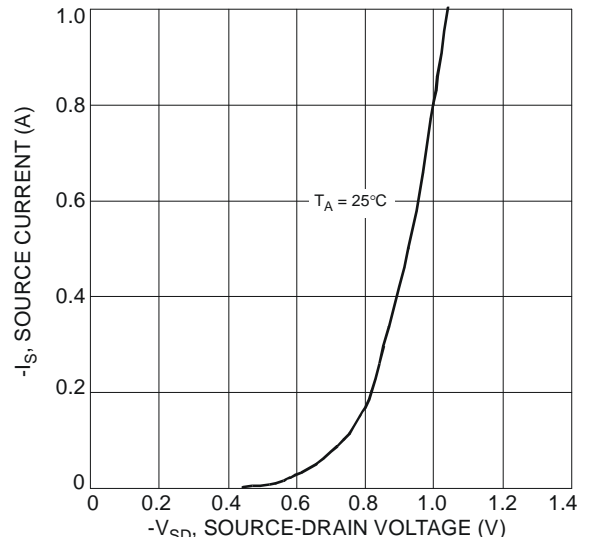


Fig. 20 Diode Forward Voltage vs. Current

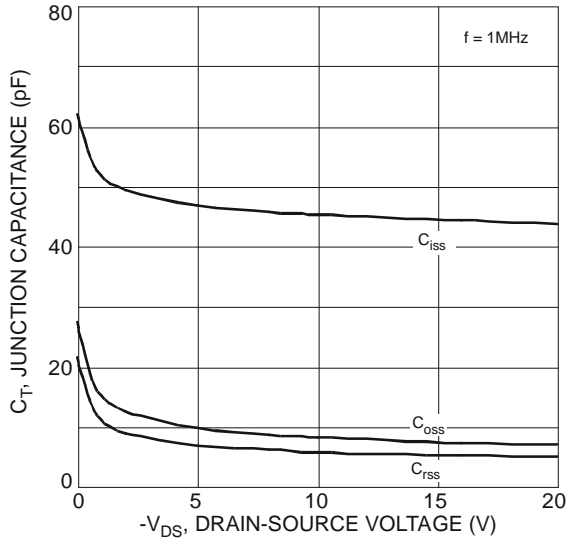


Fig. 21 Typical Junction Capacitance

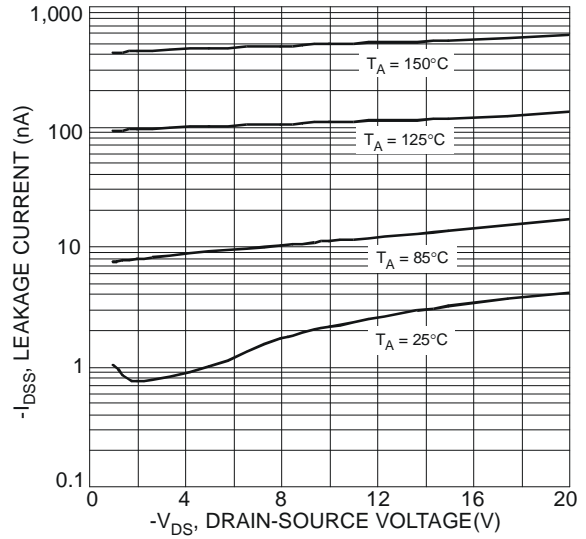


Fig. 22 Typical Drain-Source Leakage Current vs. Voltage

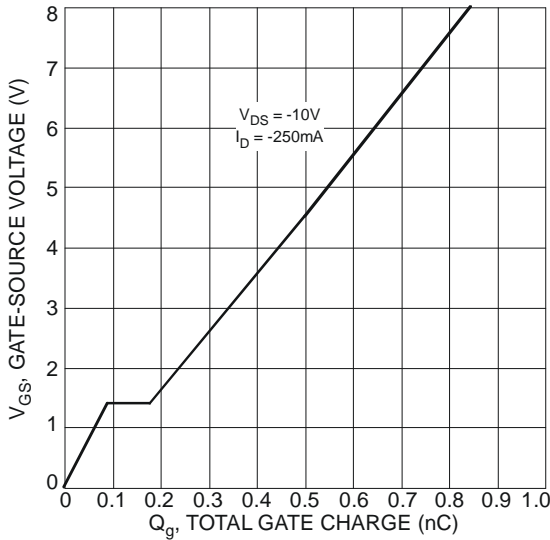


Fig. 23 Gate-Charge Characteristics

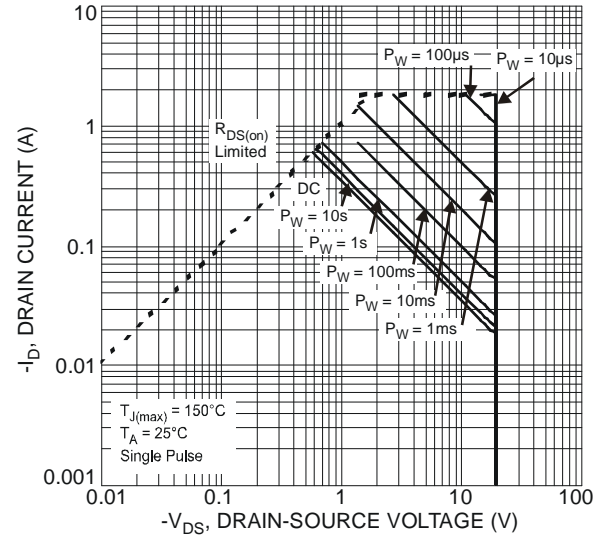


Fig. 24 SOA, Safe Operation Area

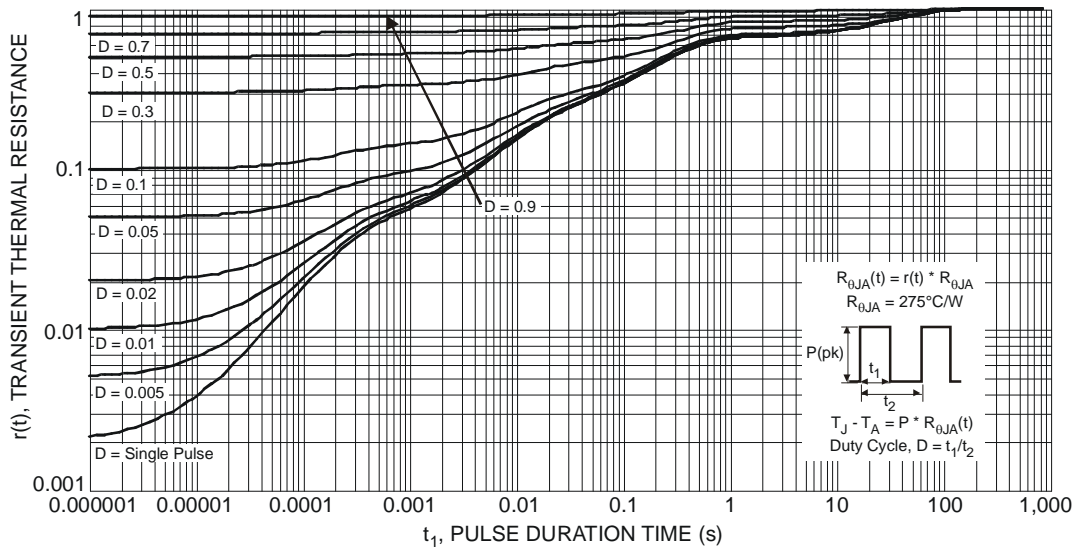
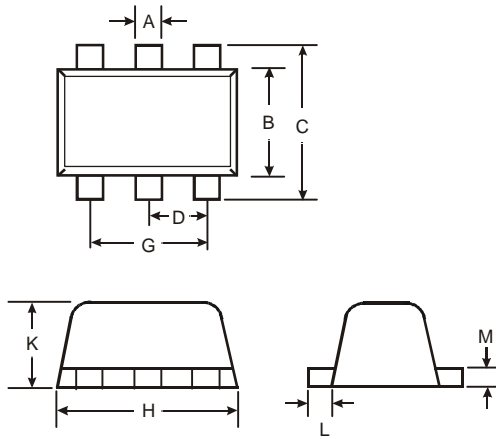


Fig. 25 Transient Thermal Response



**Package Outline Dimensions**

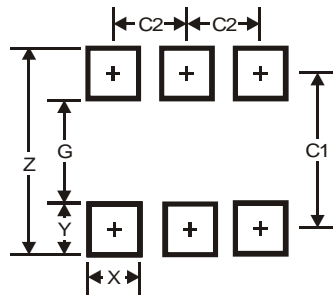
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT563			
Dim	Min	Max	Typ
A	0.15	0.30	0.20
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	-	-	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.55	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	0.11
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

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