

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**
**Product Summary**

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
Q1	60V	1.7Ω @ V <sub>GS</sub> = 10V	500mA
		3Ω @ V <sub>GS</sub> = 4.5V	400mA
Q2	-60V	4Ω @ V <sub>GS</sub> = -10V	-360mA
		6Ω @ V <sub>GS</sub> = -4.5V	-310mA

**Description**

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

**Applications**

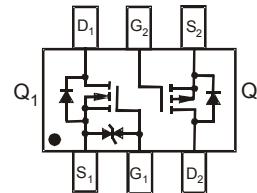
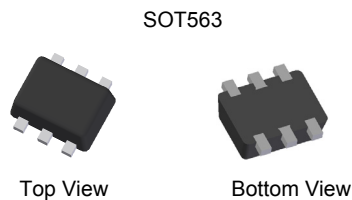
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

**Features and Benefits**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- **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**

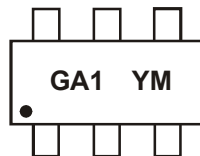
**Mechanical Data**

- 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 Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 **Ⓔ3**
- Weight: 0.027 grams (approximate)


**Ordering Information** (Note 4 & 5)

Part Number	Compliance	Case	Packaging
DMG1029SV-7	Standard	SOT563	3000/Tape & Reel
DMG1029SVQ-7	Automotive	SOT563	3000/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>.
  5. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).

**Marking Information**


GA1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: W = 2009)  
 M = Month (ex: 9 = September)

**Date Code Key**

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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 N-CHANNEL – Q1** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	60	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	500 400	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	620 480	mA
Pulsed Drain Current (Note 7)			$I_{DM}$	1000	mA

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	-60	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 7) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-360 -280	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-410 -320	mA
Pulsed Drain Current (Note 7)			$I_{DM}$	-650	mA

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	0.45	W
	$T_A = +70^\circ\text{C}$		0.28	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	281	$^\circ\text{C/W}$
	$t < 10\text{s}$		210	
Total Power Dissipation (Note 7)	$T_A = +25^\circ\text{C}$	$P_D$	1	W
	$T_A = +70^\circ\text{C}$		0.62	
Thermal Resistance, Junction to Ambient (Note 7)	Steady state	$R_{\theta JA}$	129	$^\circ\text{C/W}$
	$t < 10\text{s}$		97	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

**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 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	10	nA	@T <sub>C</sub> = +25°C V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±50	nA	V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	1.3	1.7	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 500mA
		—	1.5	3		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 200mA
Forward Transfer Admittance	Y <sub>fs</sub>	80	—	—	mS	V <sub>DS</sub> = 10V, I <sub>D</sub> = 200mA
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.4	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	30	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	4.2	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	2.9	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	0.3	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.2	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.08	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	3.9	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>r</sub>	—	3.4	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	15.7	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	9.9	—	ns	

**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 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-25	nA	@T <sub>C</sub> = +25°C V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1	—	-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>	—	2.7	4	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -500mA
		—	3.2	6		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -200mA
Forward Transfer Admittance	Y <sub>fs</sub>	50	—	—	mS	V <sub>DS</sub> = -25V, I <sub>D</sub> = -100mA
Diode Forward Voltage	V <sub>SD</sub>	—	—	-1.4	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -115mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	25	—	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	4.7	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	2.7	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	0.28	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -500mA
Gate-Source Charge	Q <sub>gs</sub>	—	0.14	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	0.08	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	5.5	—	ns	V <sub>DD</sub> = -30V, V <sub>GS</sub> = -10V, R <sub>G</sub> = 50Ω, I <sub>D</sub> = -270mA
Turn-On Rise Time	t <sub>r</sub>	—	7.9	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	10.6	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	11.6	—	ns	

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

**N-CHANNEL - Q1**

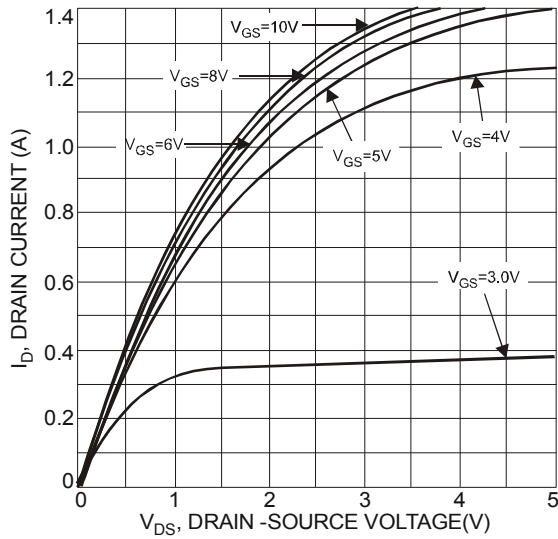


Fig. 1 Typical Output Characteristics

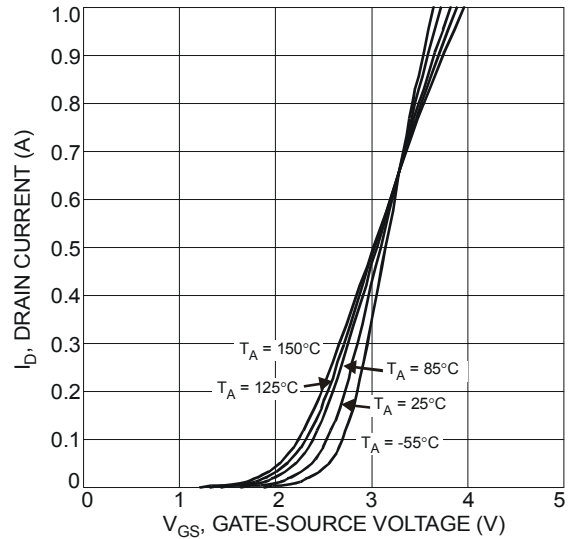


Fig. 2 Typical Transfer Characteristics

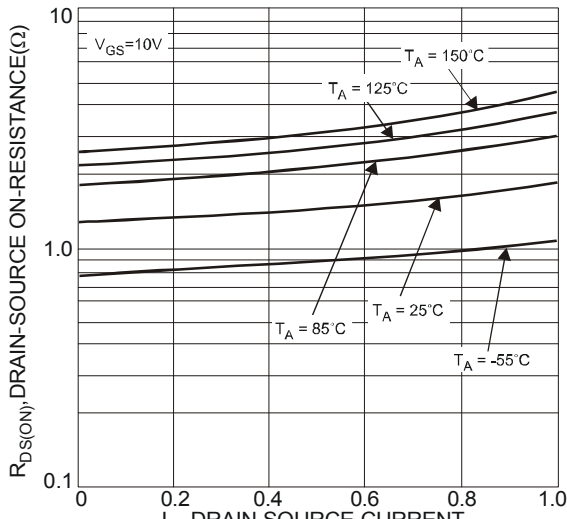


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

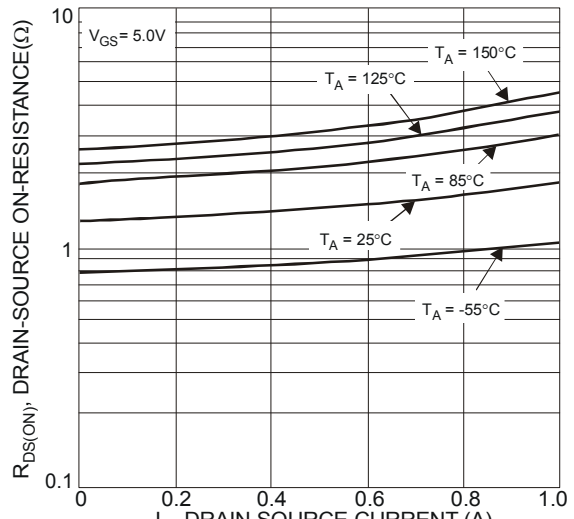


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

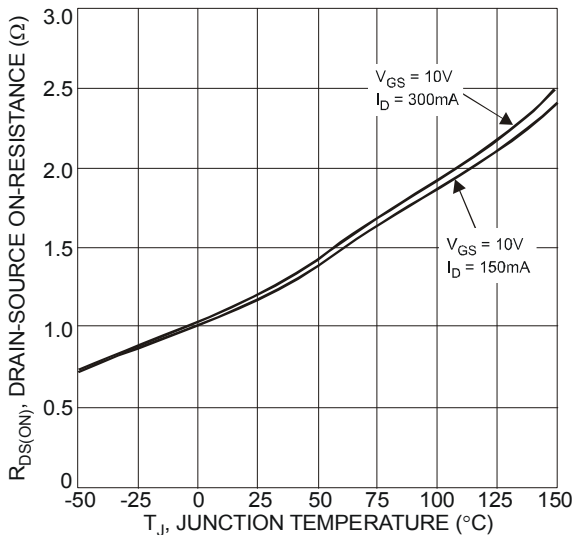


Fig. 5 On-Resistance Variation with Temperature

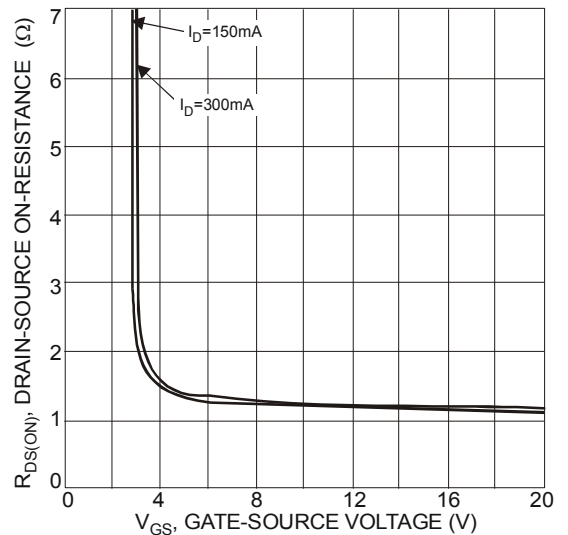
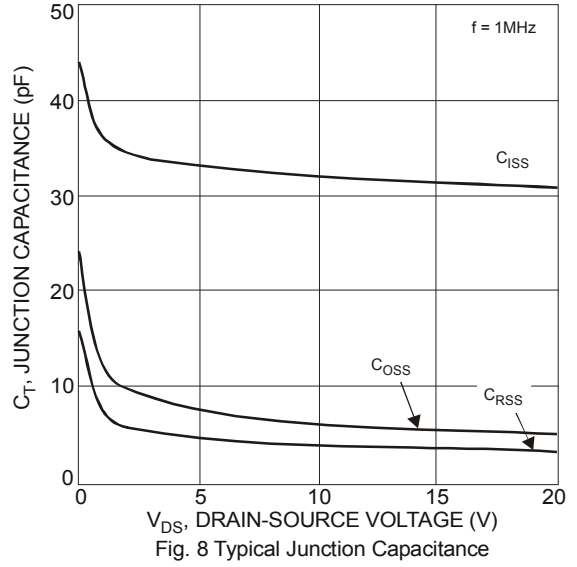
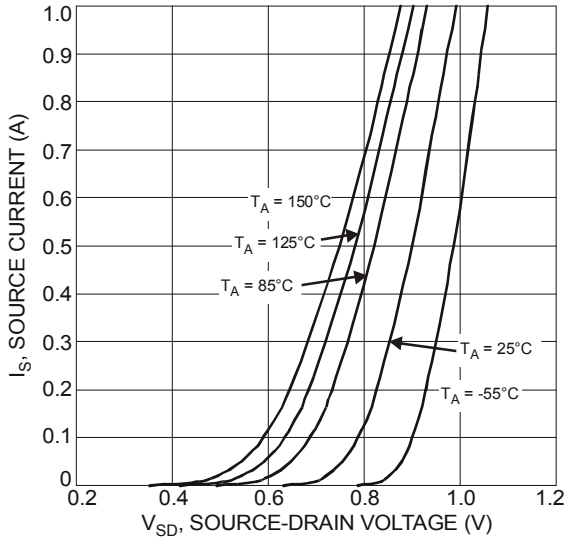


Fig. 6 Static Drain-Source On-Resistance vs. Gate-Source Voltage



**P-CHANNEL – Q2**

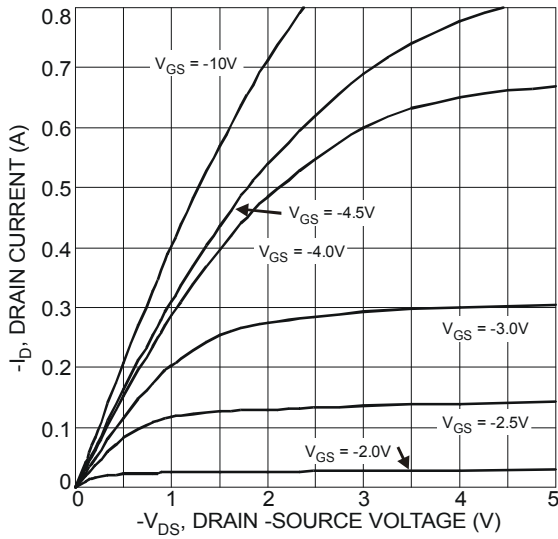


Fig. 9 Typical Output Characteristics

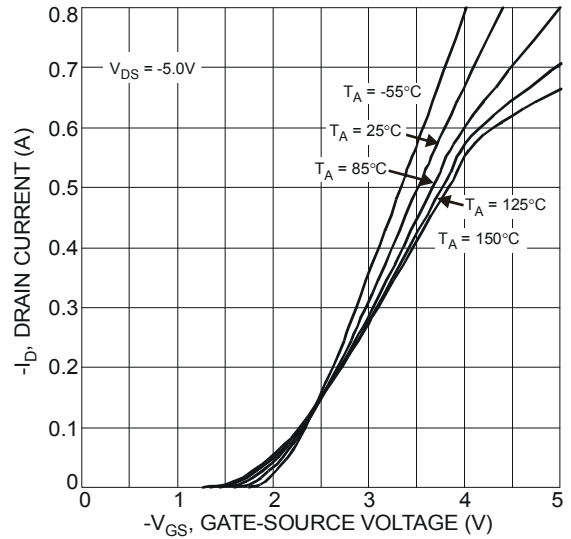


Fig. 10 Typical Transfer Characteristics

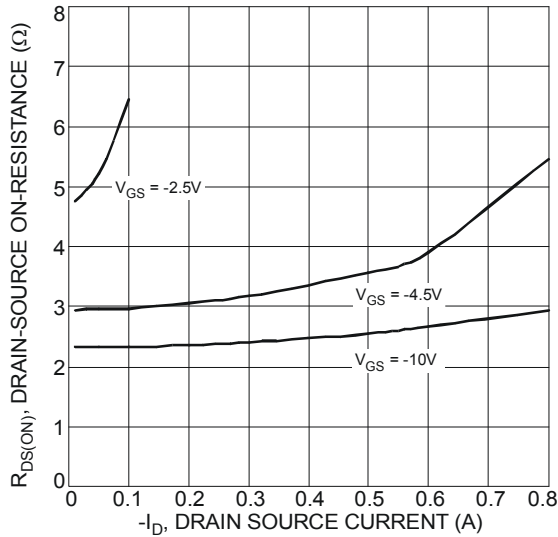


Fig. 11 Typical On-Resistance vs. Drain Current and Gate Voltage

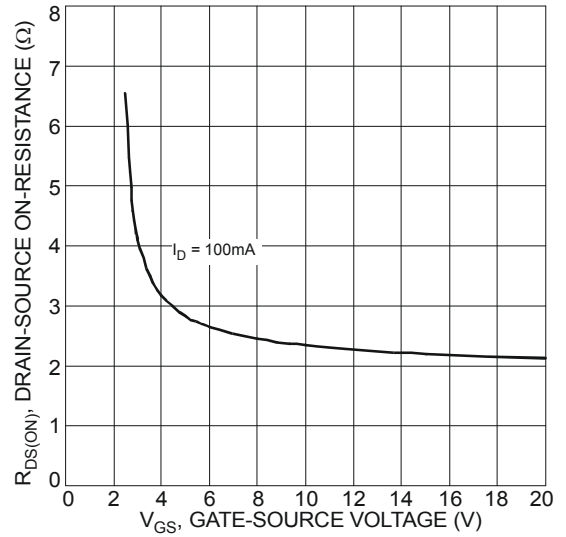


Fig. 12 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

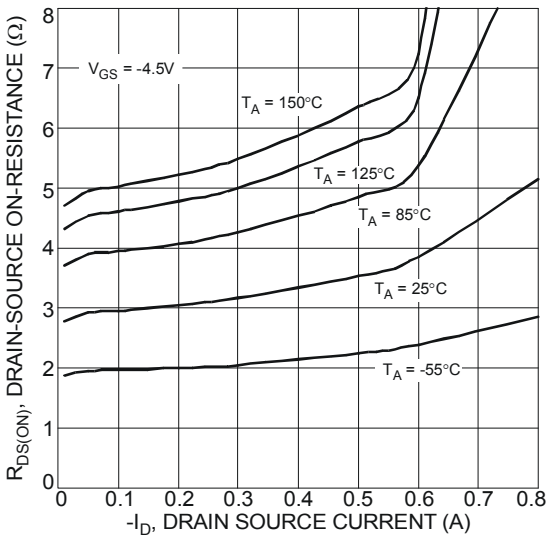


Fig. 13 Typical On-Resistance vs. Drain Current and Temperature

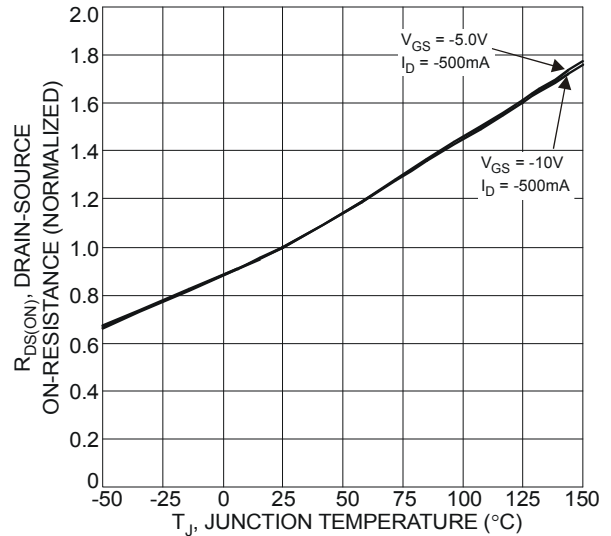


Fig. 14 On-Resistance Variation with Temperature

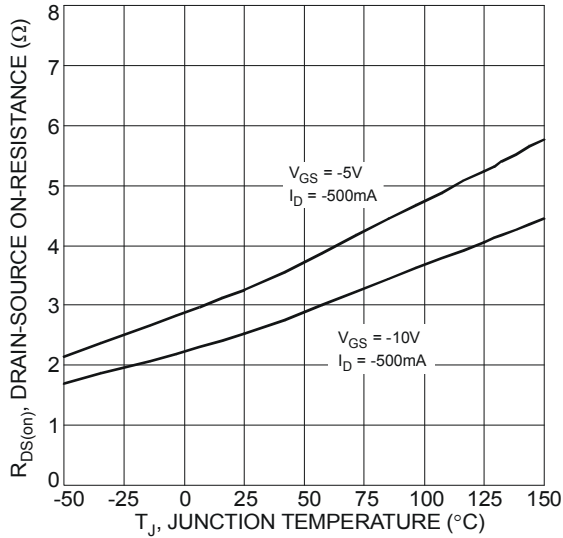


Fig. 15 On-Resistance Variation with Temperature

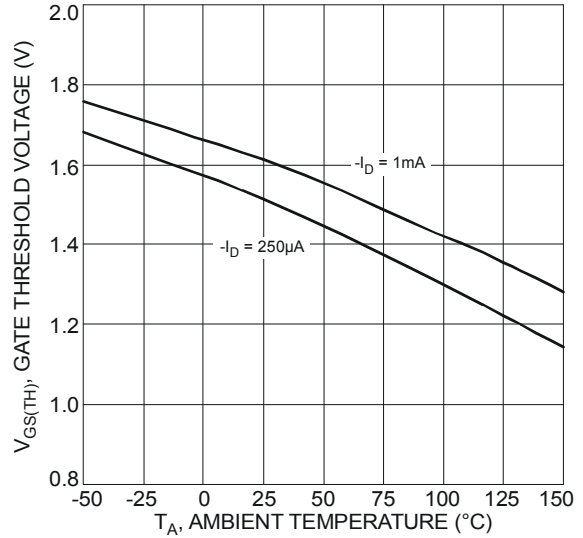


Fig. 16 Gate Threshold Variation vs. Ambient Temperature

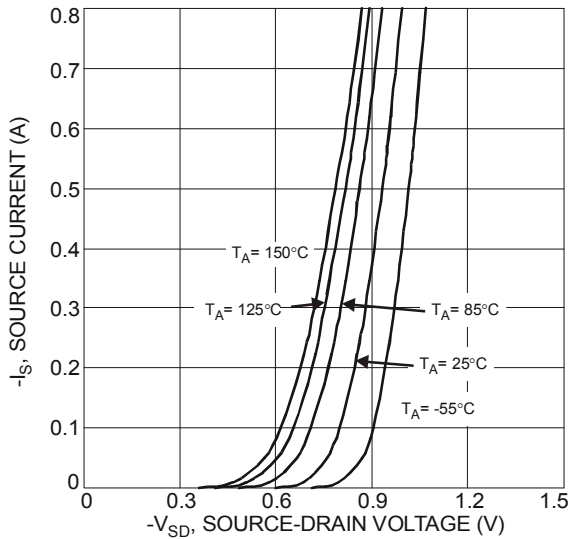


Fig. 17 Diode Forward Voltage vs. Current

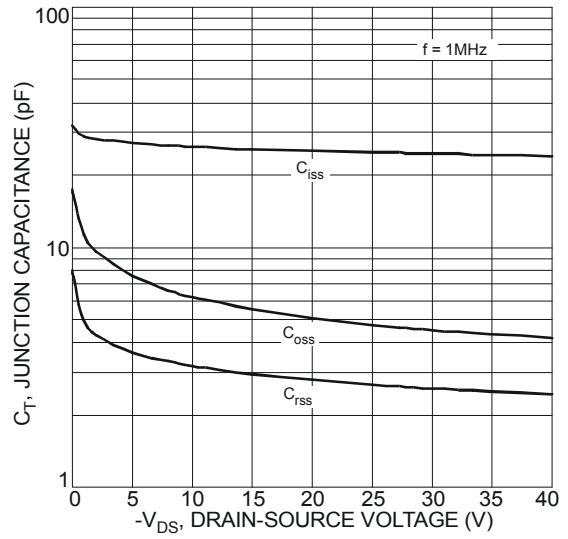


Fig. 18 Typical Junction Capacitance

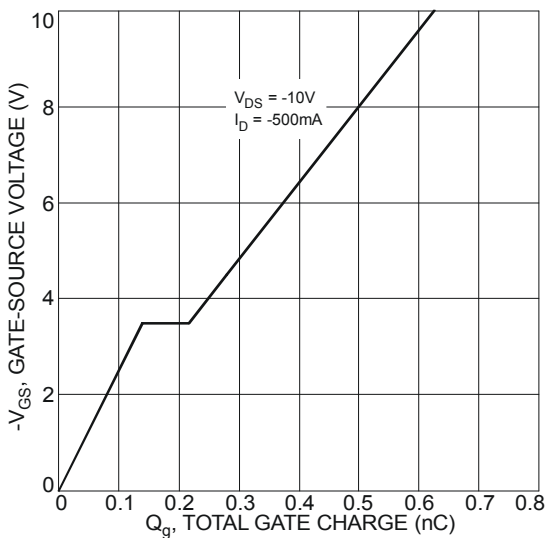
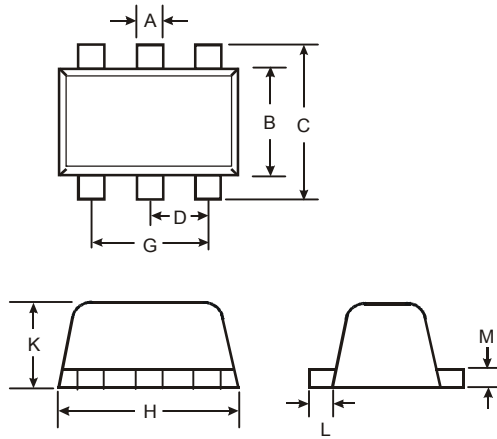


Fig. 19 Gate-Charge Characteristics

**Package Outline Dimensions**

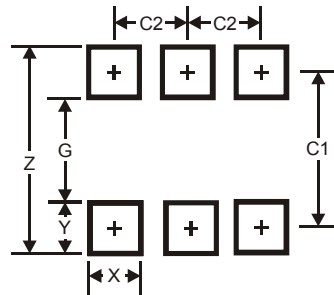
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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 AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for 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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