COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
Q1	60V	1.7Ω @ V_{GS} = 10V	500mA
		3Ω @ V_{GS} = 4.5V	400mA
Q2	-60V	4Ω @ V_{GS} = -10V	-360mA
		6Ω @ V_{GS} = -4.5V	-310mA

Description

This MOSFET has been 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

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

Features and Benefits

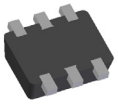
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

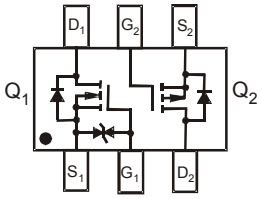
- Case: SOT563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.027 grams (approximate)

SOT563

Top View



Bottom View

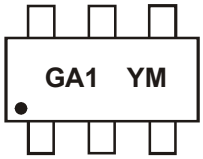


Ordering Information (Note 4 & 5)

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 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/.

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

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Maximum Ratings N-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

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

Maximum Ratings P-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

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

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

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

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Electrical Characteristics N-CHANNEL – Q1 (@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}	60	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	10	nA	V_{DS} =50V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±50	nA	V_{GS} = ±5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	2.5	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.3	1.7	Ω	V_{GS} = 10V, I_D = 500mA
		—	1.5	3		V_{GS} = 4.5V, I_D = 200mA
Forward Transfer Admittance	$\|Y_{fs}\|$	80	—	—	mS	V_{DS} = 10V, I_D = 200mA
Diode Forward Voltage	V_{SD}	—	—	1.4	V	V_{GS} = 0V, I_S = 115mA
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	30	—	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	4.2	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.9	—	pF	
Total Gate Charge	Q_g	—	0.3	—	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	—	0.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.08	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	3.9	—	ns	V_{DD} = 30V, V_{GS} = 10V, R_G = 25Ω, I_D = 200mA
Turn-On Rise Time	t_r	—	3.4	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	15.7	—	ns	
Turn-Off Fall Time	t_f	—	9.9	—	ns	

Electrical Characteristics P-CHANNEL – Q2 (@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}	-60	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-25	nA	V_{DS} = -50V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	—	-3.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	2.7	4	Ω	V_{GS} = -10V, I_D = -500mA
		—	3.2	6		V_{GS} = -4.5V, I_D = -200mA
Forward Transfer Admittance	$\|Y_{fs}\|$	50	—	—	mS	V_{DS} = -25V, I_D = -100mA
Diode Forward Voltage	V_{SD}	—	—	-1.4	V	V_{GS} = 0V, I_S = -115mA
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	25	—	pF	V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	4.7	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.7	—	pF	
Total Gate Charge	Q_g	—	0.28	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -500mA
Gate-Source Charge	Q_{gs}	—	0.14	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.08	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	5.5	—	ns	V_{DD} = -30V, V_{GS} = -10V, R_G = 50Ω, I_D = -270mA
Turn-On Rise Time	t_r	—	7.9	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	10.6	—	ns	
Turn-Off Fall Time	t_f	—	11.6	—	ns	

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

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N-CHANNEL – Q1

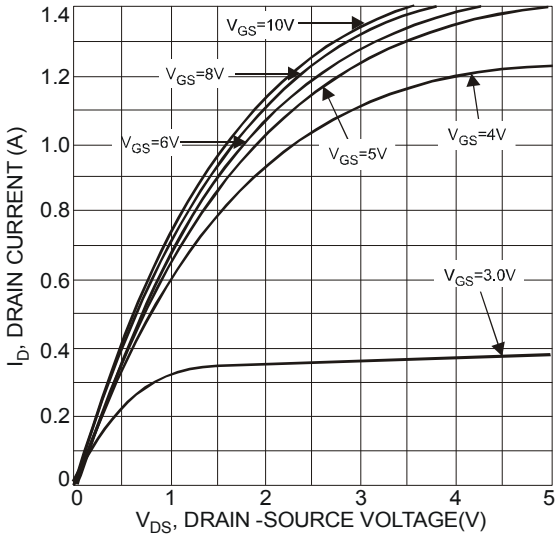

Fig. 1 Typical Output Characteristics

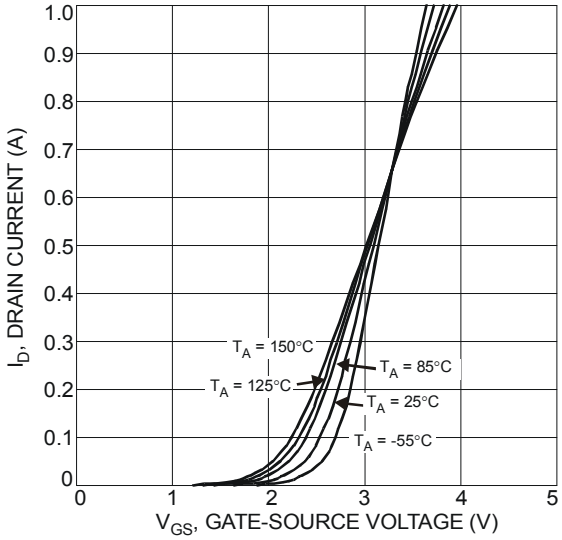

Fig. 2 Typical Transfer Characteristics

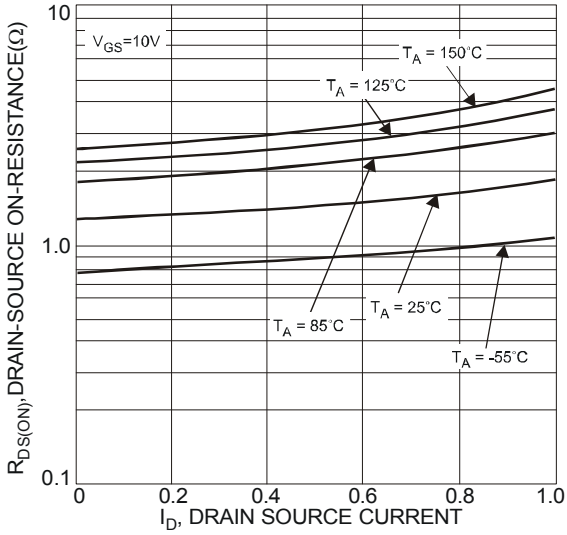

Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

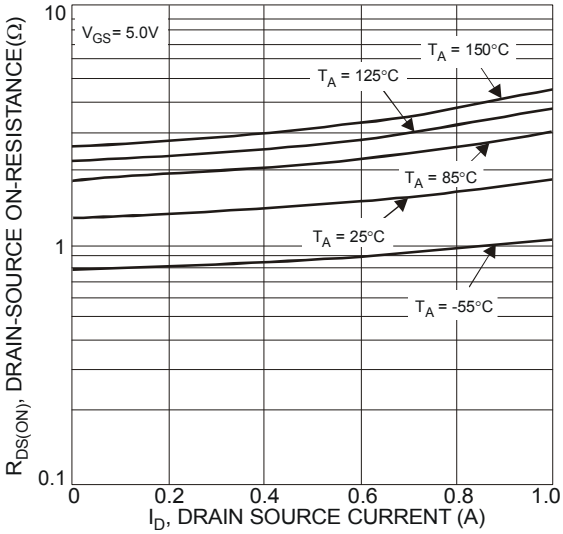

Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

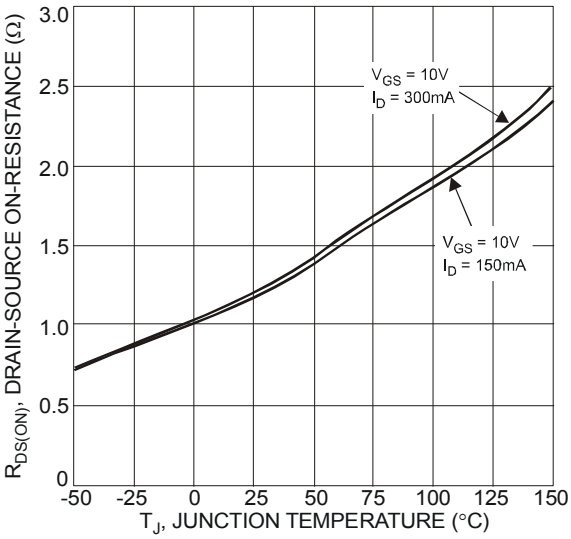

Fig. 5 On-Resistance Variation with Temperature

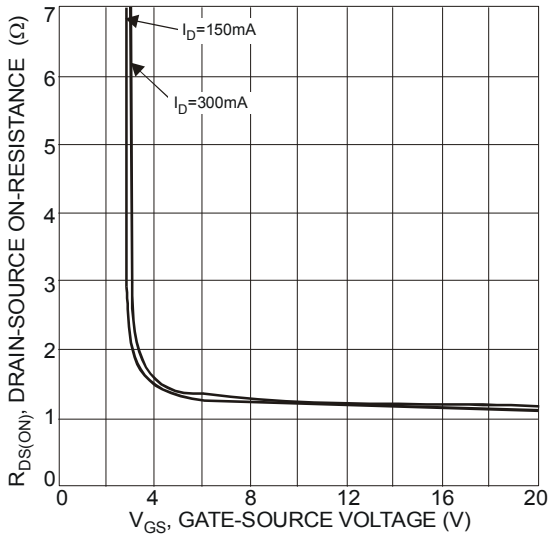

Fig. 6 Static Drain-Source On-Resistance vs. Gate-Source Voltage

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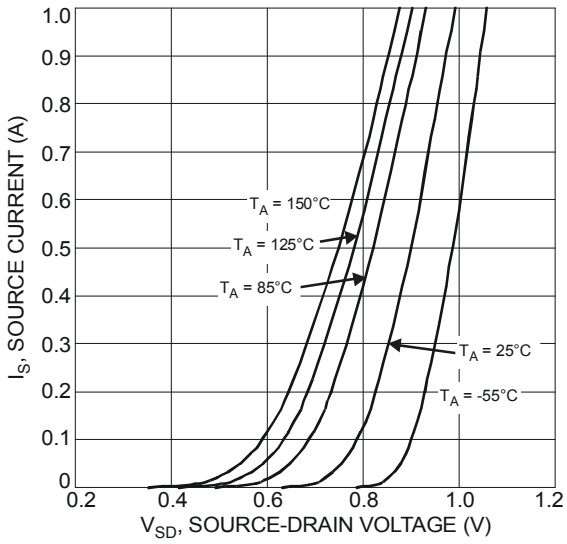

Fig. 7 Diode Forward Voltage vs. Current

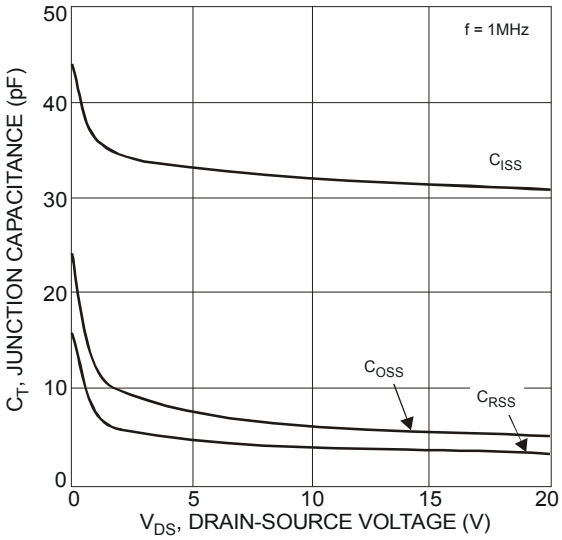

Fig. 8 Typical Junction Capacitance

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P-CHANNEL – Q2

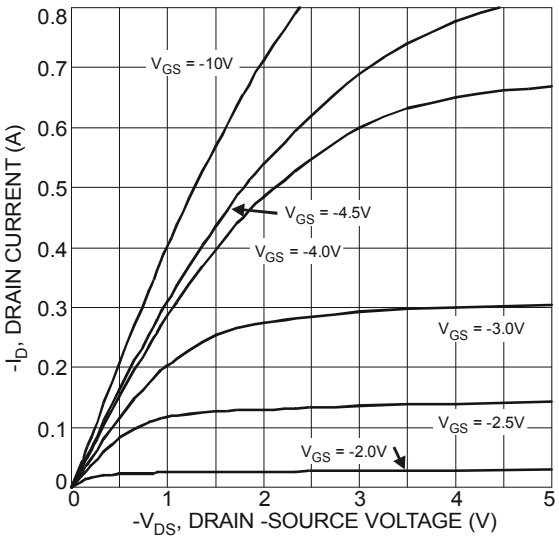

Fig. 9 Typical Output Characteristics

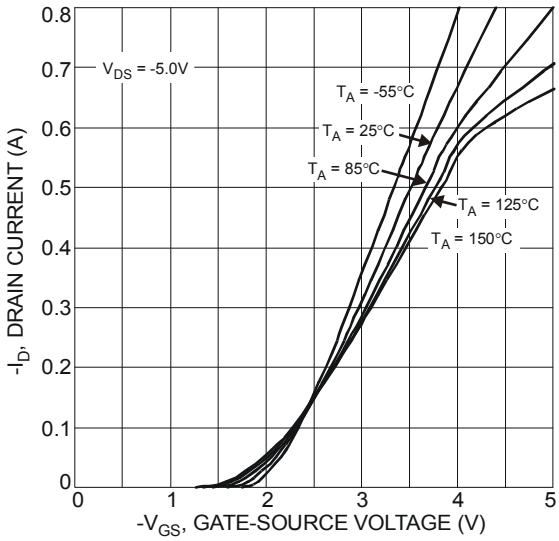

Fig. 10 Typical Transfer Characteristics

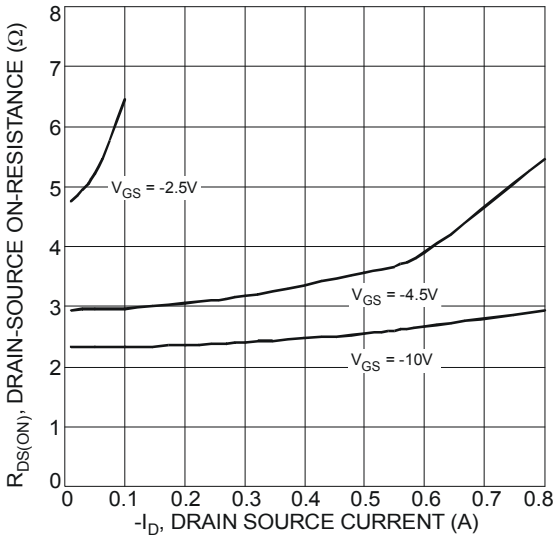

Fig. 11 Typical On-Resistance vs. Drain Current and Gate Voltage

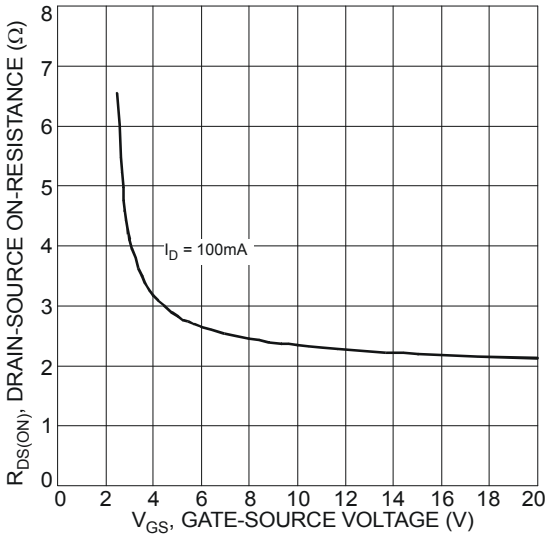

Fig. 12 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

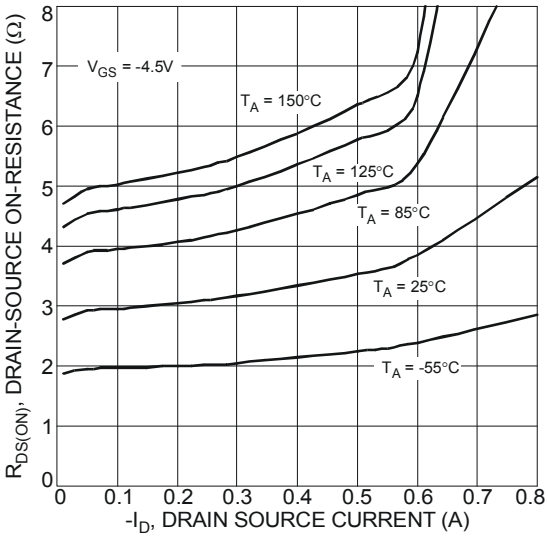

Fig. 13 Typical On-Resistance vs. Drain Current and Temperature

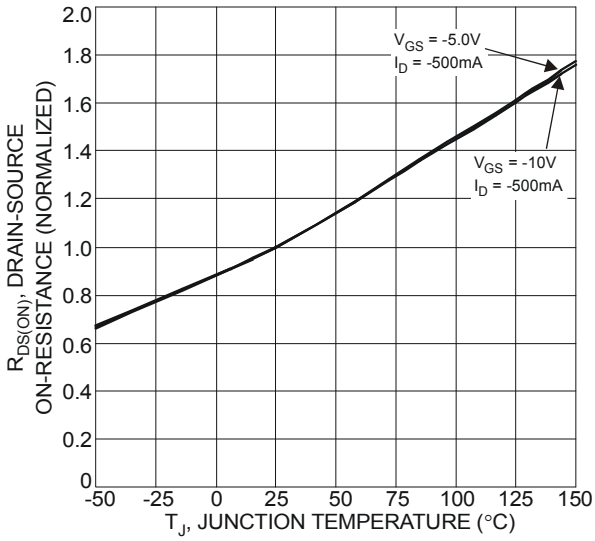

Fig. 14 On-Resistance Variation with Temperature

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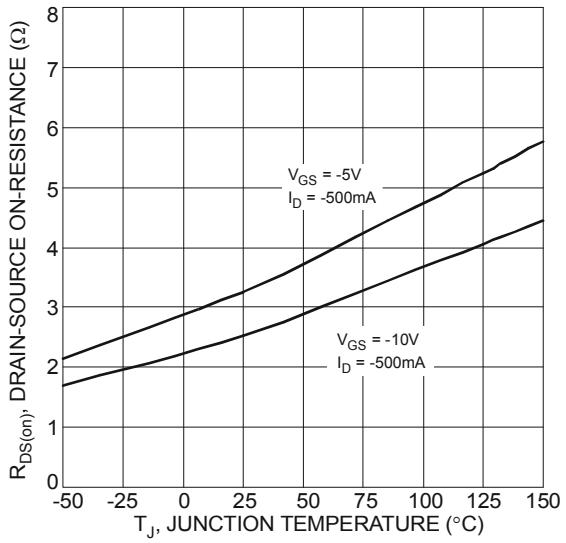

Fig. 15 On-Resistance Variation with Temperature

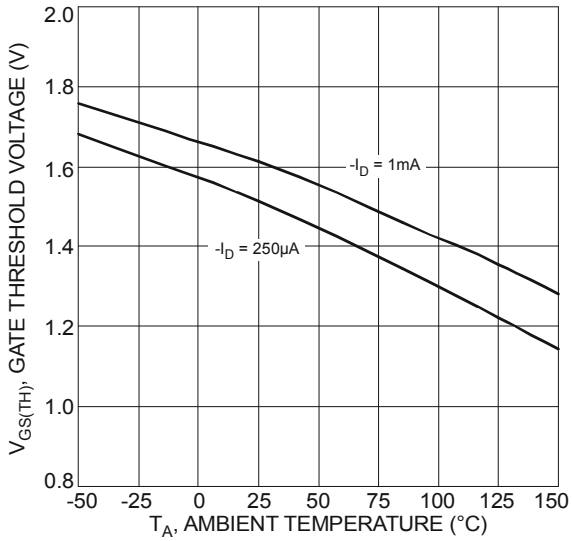

Fig. 16 Gate Threshold Variation vs. Ambient Temperature

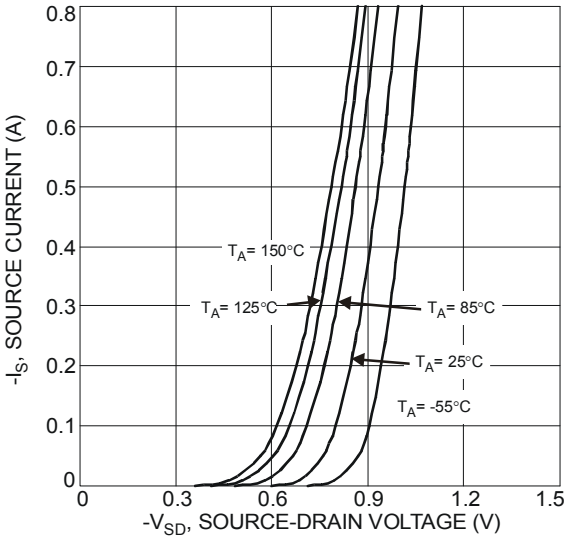

Fig. 17 Diode Forward Voltage vs. Current

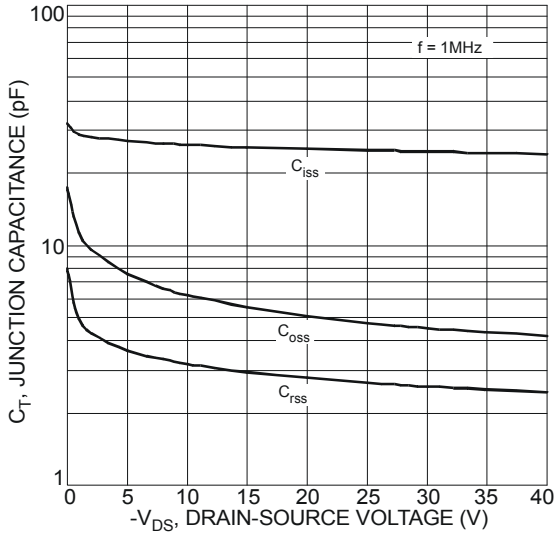

Fig. 18 Typical Junction Capacitance

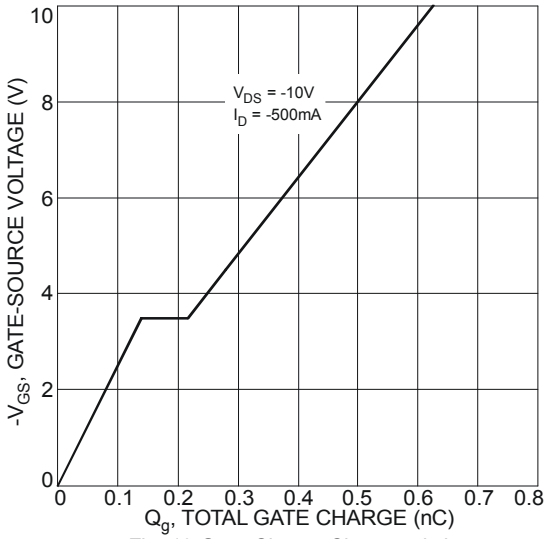

Fig. 19 Gate-Charge Characteristics

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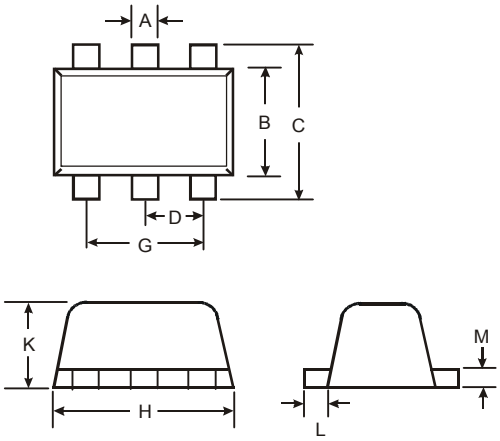
Package Outline Dimensions

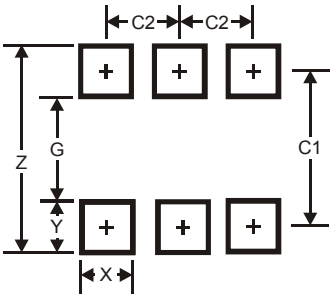
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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