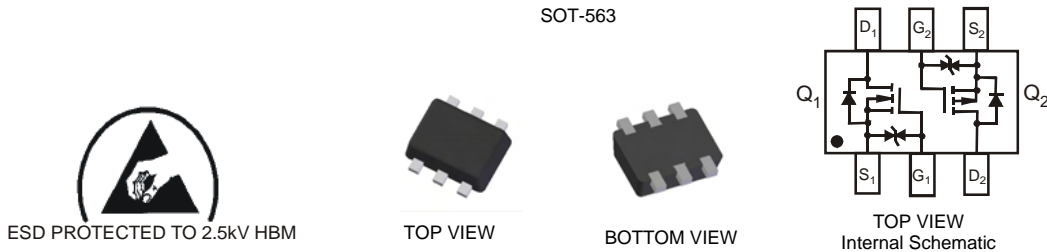


## Features

- Low On-Resistance
- Low Gate Threshold Voltage  $V_{GS(th)} < 1V$
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 2)**
- **ESD Protected Gate to 2.5kV HBM**
- "Green" Device (Note 3)
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 7
- Ordering Information: See Page 7
- Weight: 0.006 grams (approximate)



## Maximum Ratings N-CHANNEL – Q<sub>1</sub> @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Drain Source Voltage	$V_{DSS}$	20	V
Gate-Source Voltage	$V_{GSS}$	±6	V
Drain Current (Note 1)	$T_A = 25^\circ C$	870	mA
	$T_A = 85^\circ C$	630	

## Maximum Ratings P-CHANNEL – Q<sub>2</sub> @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Drain Source Voltage	$V_{DSS}$	-20	V
Gate-Source Voltage	$V_{GSS}$	±6	V
Drain Current (Note 1)	$T_A = 25^\circ C$	-640	mA
	$T_A = 85^\circ C$	-460	

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	$P_D$	530	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	235	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

- Notes:
1. Device mounted on FR-4 PCB.
  2. No purposefully added lead.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).

**Electrical Characteristics N-CHANNEL – Q<sub>1</sub>** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	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> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.3	0.4	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 600mA
		—	0.4	0.5		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 500mA
		—	0.5	0.7		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA
Forward Transfer Admittance	Y <sub>fs</sub>	—	1.4	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 400mA
Diode Forward Voltage (Note 4)	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	—	60.67	—	pF	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	9.68	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	5.37	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	736.6	—	pC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	—	93.6	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	116.6	—		
Turn-On Delay Time	t <sub>d(on)</sub>	—	5.1	—	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>	—	7.4	—		
Turn-Off Delay Time	t <sub>d(off)</sub>	—	26.7	—		
Turn-Off Fall Time	t <sub>f</sub>	—	12.3	—		

**Electrical Characteristics P-CHANNEL – Q<sub>2</sub>** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-100	nA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	± 2.0	μA	V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.5	—	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	0.5	0.7	Ω	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -430mA
		—	0.7	0.9		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -300mA
		—	1.0	1.3		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -150mA
Forward Transfer Admittance	Y <sub>fs</sub>	—	-0.9	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = -250mA
Diode Forward Voltage (Note 4)	V <sub>SD</sub>	—	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -150mA
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	—	59.76	—	pF	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	12.07	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	6.36	—	pF	
Total Gate Charge	Q <sub>g</sub>	—	622.4	—	pC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Gate-Source Charge	Q <sub>gs</sub>	—	100.3	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	132.2	—		
Turn-On Delay Time	t <sub>d(on)</sub>	—	5.1	—	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>	—	8.1	—		
Turn-Off Delay Time	t <sub>d(off)</sub>	—	28.4	—		
Turn-Off Fall Time	t <sub>f</sub>	—	20.7	—		

Notes: 4. Short duration pulse test used to minimize self-heating effect.

**N-CHANNEL – Q<sub>1</sub>**

NEW PRODUCT

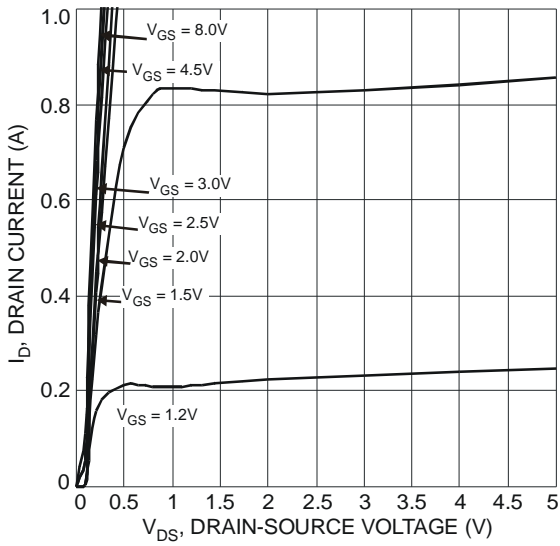


Fig. 1 Typical Output Characteristic

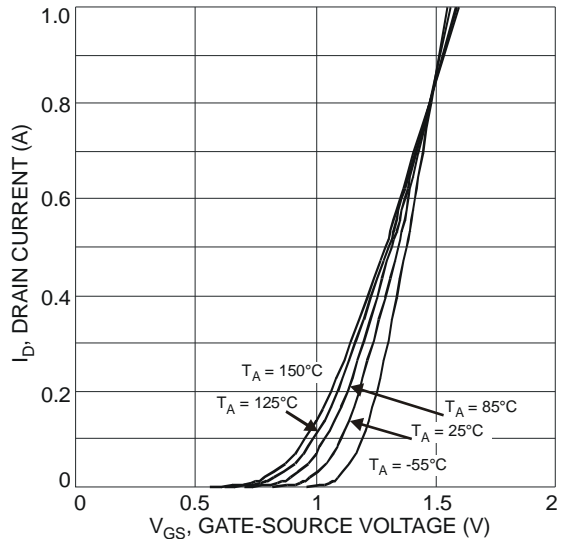


Fig. 2 Typical Transfer Characteristic

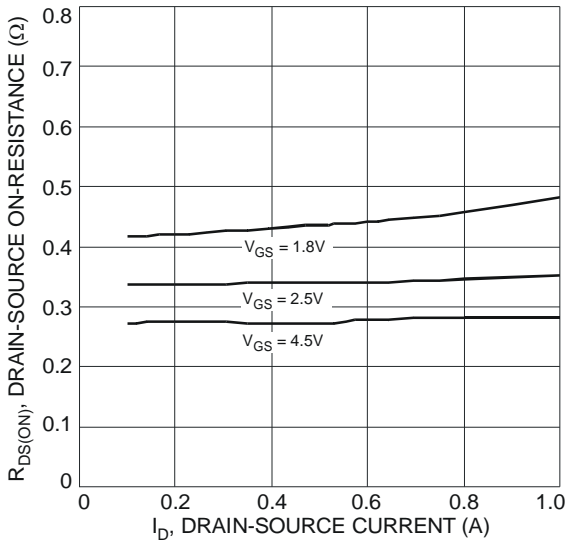


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

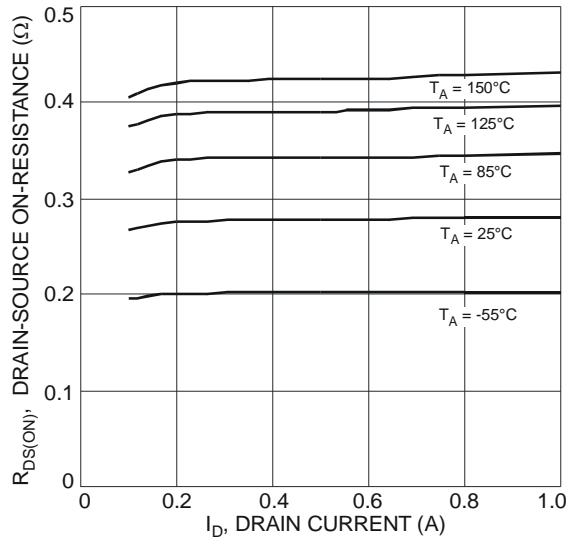


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

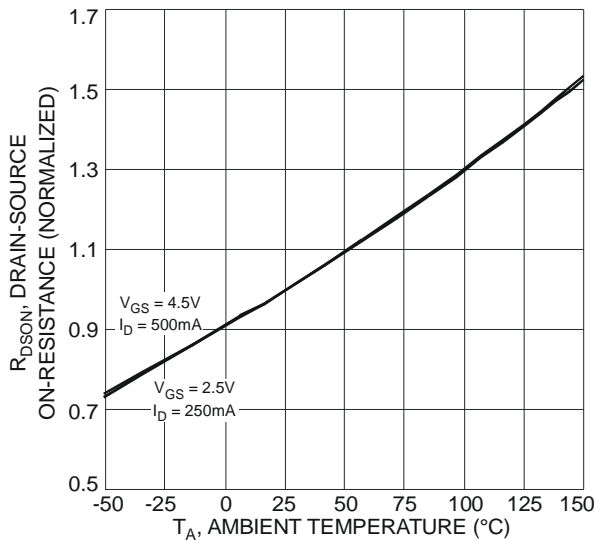


Fig. 5 On-Resistance Variation with Temperature

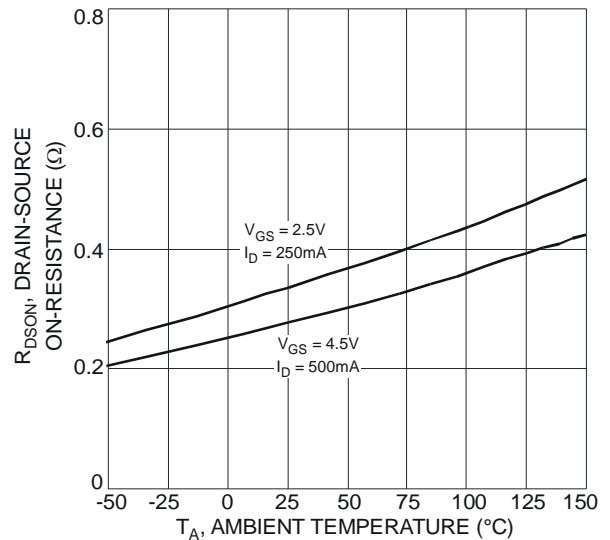


Fig. 6 On-Resistance Variation with Temperature

**N-CHANNEL – Q<sub>1</sub> (continued)**

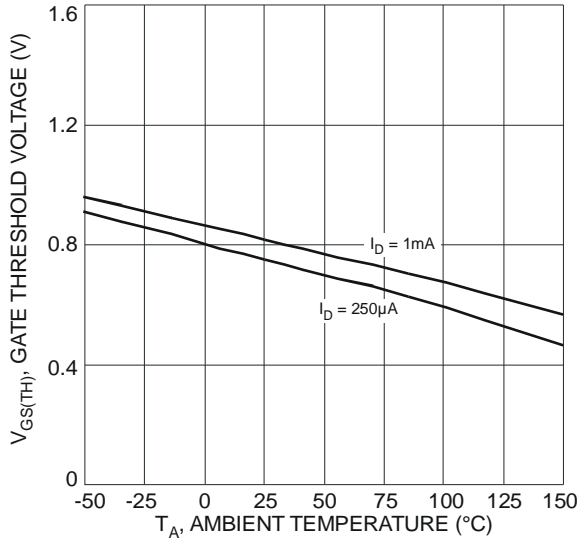


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

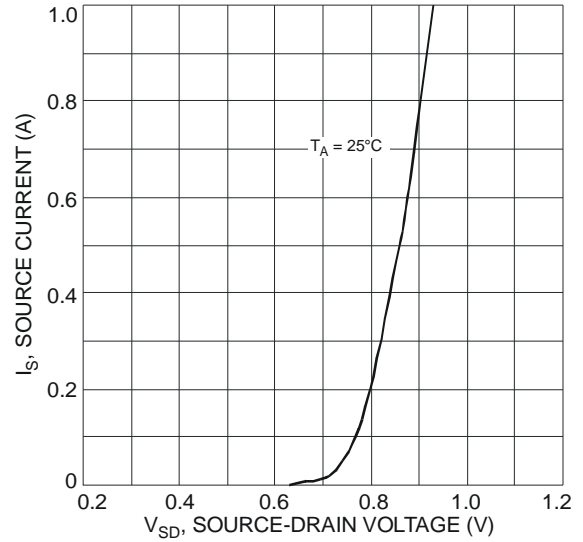


Fig. 8 Diode Forward Voltage vs. Current

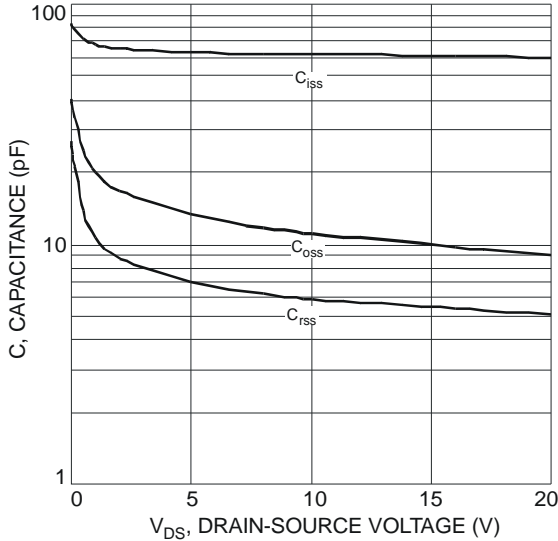


Fig. 9 Typical Total Capacitance

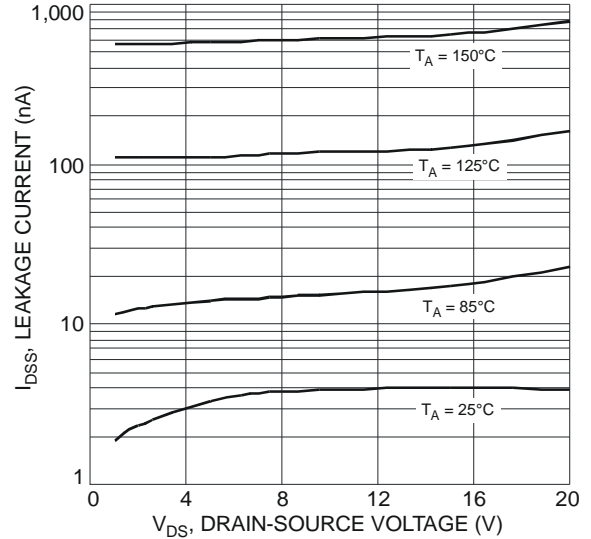


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

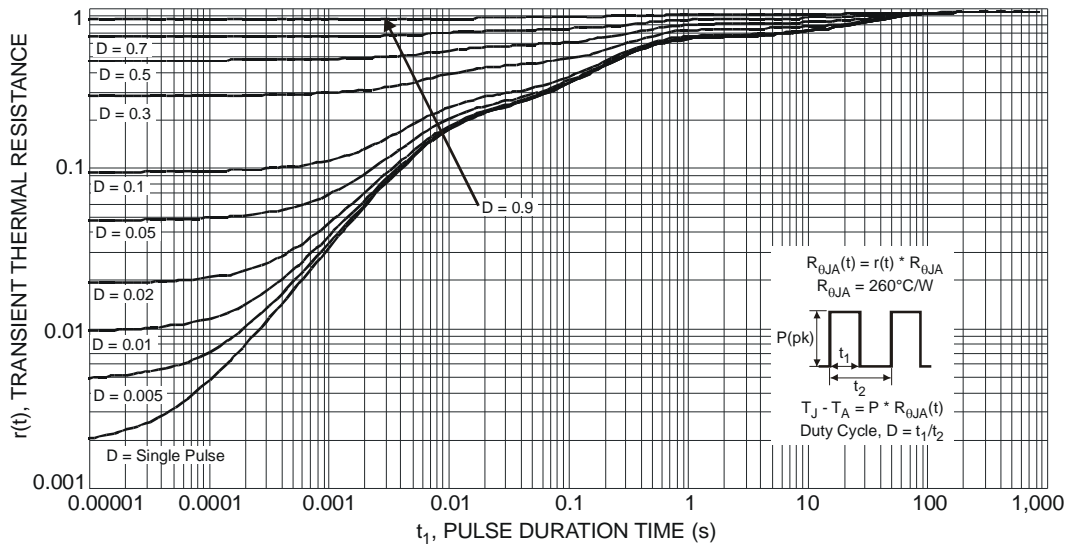


Fig. 11 Transient Thermal Response

**P-CHANNEL – Q<sub>2</sub>**

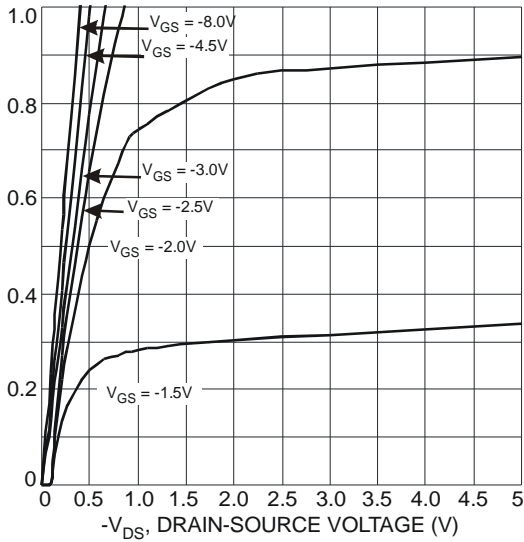


Fig. 12 Typical Output Characteristic

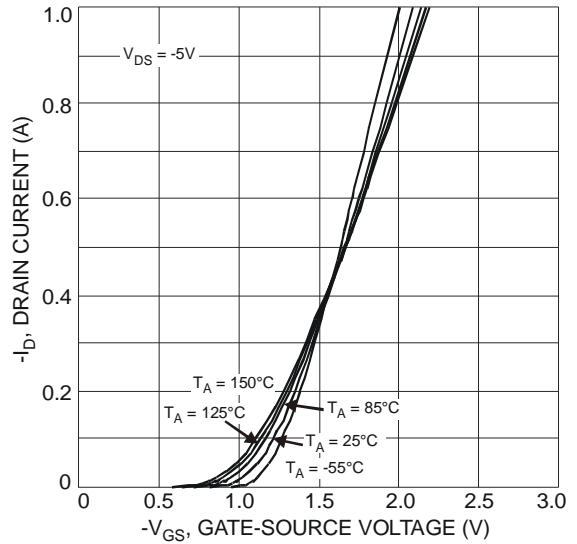


Fig. 13 Typical Transfer Characteristic

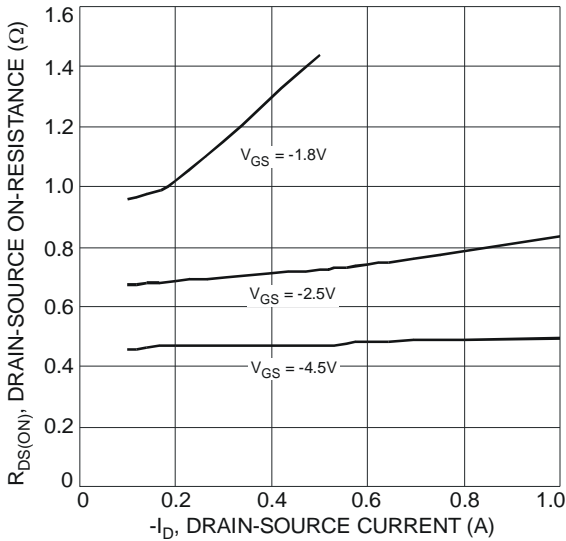


Fig. 14 Typical On-Resistance vs. Drain Current and Gate Voltage

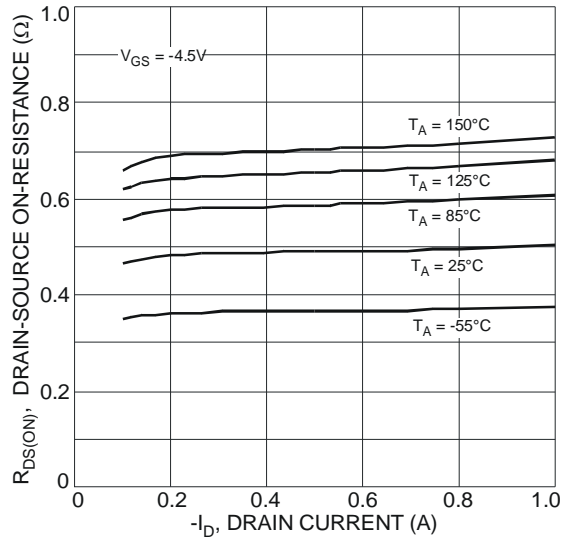


Fig. 15 Typical On-Resistance vs. Drain Current and Temperature

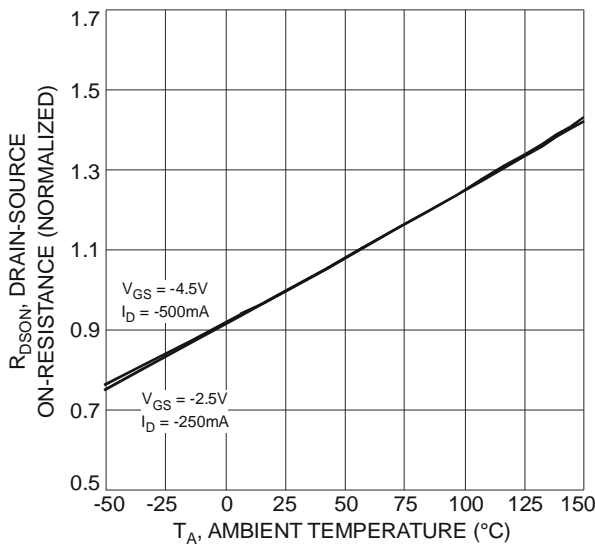


Fig. 16 On-Resistance Variation with Temperature

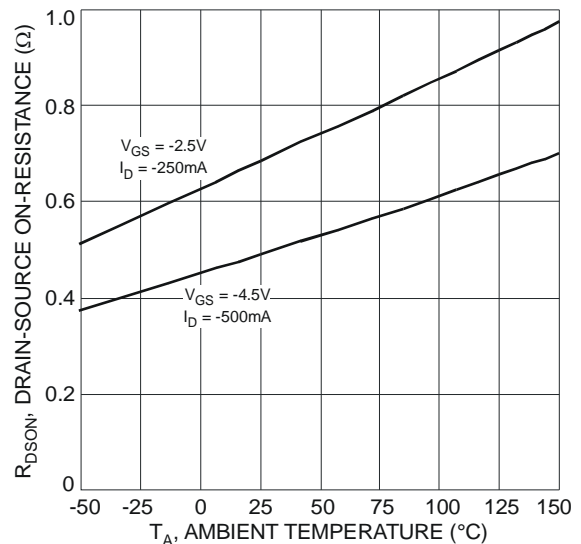


Fig. 17 On-Resistance Variation with Temperature

**P-CHANNEL – Q<sub>2</sub> (continued)**

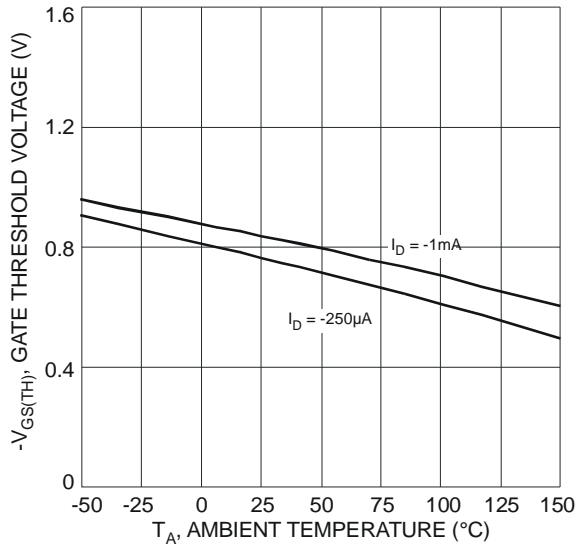


Fig. 18 Gate Threshold Variation vs. Ambient Temperature

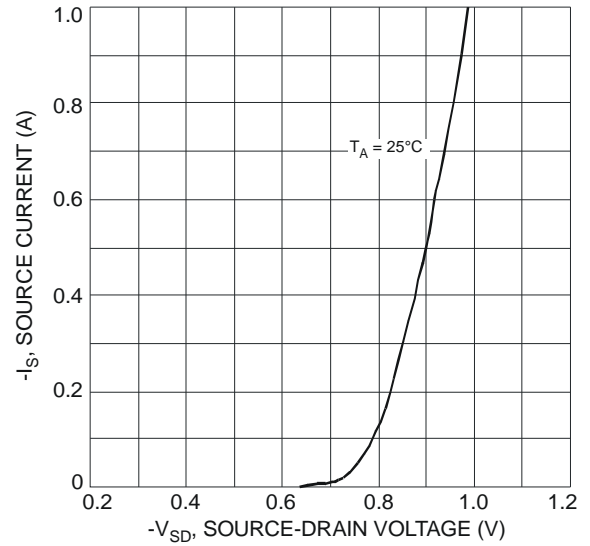


Fig. 19 Diode Forward Voltage vs. Current

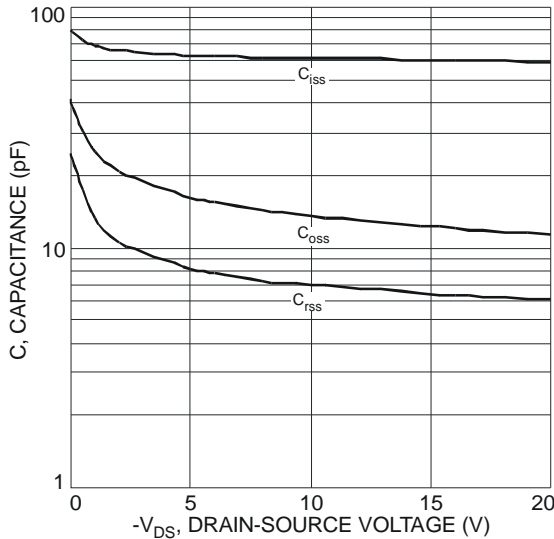


Fig. 20 Typical Total Capacitance

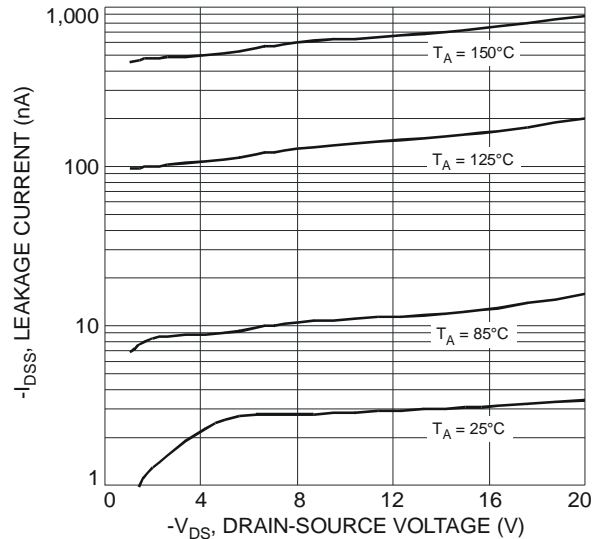


Fig. 21 Typical Leakage Current vs. Drain-Source Voltage

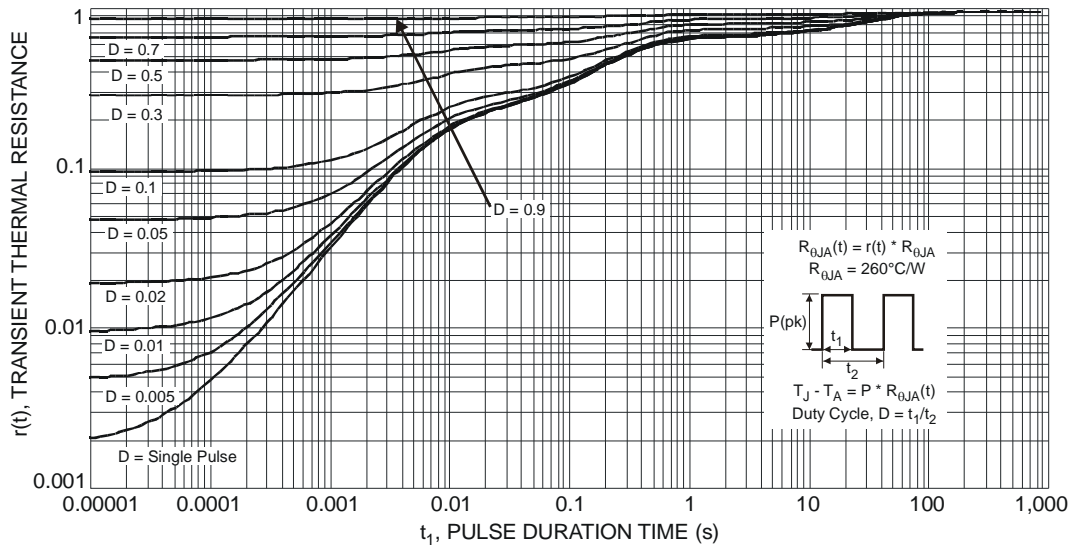


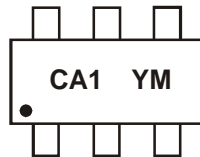
Fig. 22 Transient Thermal Response

**Ordering Information** (Note 5)

Part Number	Case	Packaging
DMG1016V-7	SOT-563	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



CA1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: W = 2009)  
 M = Month (ex: 9 = September)

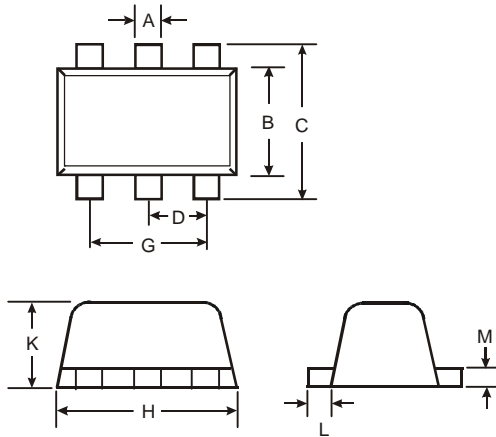
Date Code Key

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

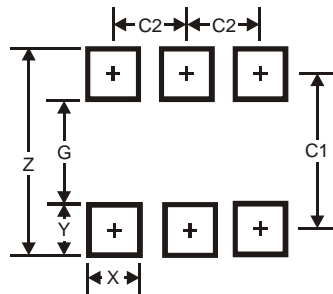
**Package Outline Dimensions**



SOT-563			
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**



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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