COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = 25°C
Q1	20V	0.45Ω @ V_{GS} = 4.5V	1066mA
Q2		0.75Ω @ V_{GS} =- 4.5V	-845mA

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant (Note 1)
- ESD Protected Up to 2.5kV
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliabilit

Description and Applications

This new generation 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.

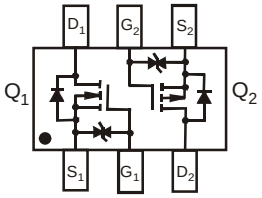
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Power Supply Converter Circuits

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 1
- Ordering Information: See Page 1
- Weight: 0.006 grams (approximate)


ESD PROTECTED


TOP VIEW



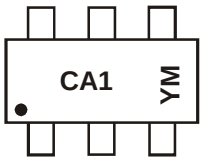
TOP VIEW
Internal Schematic

Ordering Information (Note 3)

Part Number	Qualification	Case	Packaging
DMG1016UDW-7	Commercial	SOT-363	3000/Tape & Reel
DMG1016UDWQ-7	Automotive	SOT-363	3000/Tape & Reel

Notes: 1. No purposefully added lead.
2. Diodes Inc.’s “Green” policy can be found on our website at http://www.diodes.com.
3. 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)

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P_D	330	mW
Thermal Resistance, Junction to Ambient (Note 4)	$R_{\theta JA}$	379	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Maximum Ratings N-CHANNEL – Q1 @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±6	V
Continuous Drain Current (Note 4) V_{GS} = 10V	Steady State	T_A = 25°C T_A = 85°C	I_D	1066 690	mA

Maximum Ratings P-CHANNEL – Q2 @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±6	V
Continuous Drain Current (Note 4) V_{GS} = 10V	Steady State	T_A = 25°C T_A = 85°C	I_D	845 548	mA

Notes: 4. Device mounted on FR-4 PCB with minimum recommended pad layout.

Electrical Characteristics N-CHANNEL – Q1 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 5)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	-	-	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current @T_c = 25°C	I_{DSS}	-	-	100	nA	V_{DS} =20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±1.0	μA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 5)						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	0.3	0.45	Ω	V_{GS} = 4.5V, I_D = 600mA
			0.4	0.6		V_{GS} = 2.5V, I_D = 500mA
			0.5	0.75		V_{GS} = 1.8V, I_D = 350mA
Forward Transfer Admittance	$\|Y_{fs}\|$	-	1.4	-	S	V_{DS} = 10V, I_D = 400mA
Diode Forward Voltage (Note 5)	V_{SD}	-	0.7	1.2	V	V_{GS} = 0V, I_S = 150mA
DYNAMIC CHARACTERISTICS (Note 6)						
Input Capacitance	C_{iss}	-	60.67	-	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	9.68	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	5.37	-	pF	
Total Gate Charge (4.5V)	Q_g	-	736.6	-	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	-	93.6	-	nC	
Gate-Drain Charge	Q_{gd}	-	116.6	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	5.1	-	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47Ω, R_G = 10Ω,
Turn-On Rise Time	t_r	-	7.4	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	26.7	-	ns	
Turn-Off Fall Time	t_f	-	12.3	-	ns	

Notes: 5. Short duration pulse test used to minimize self-heating effect.
6. Guaranteed by design. Not subject to production testing.

N-CHANNEL – Q1

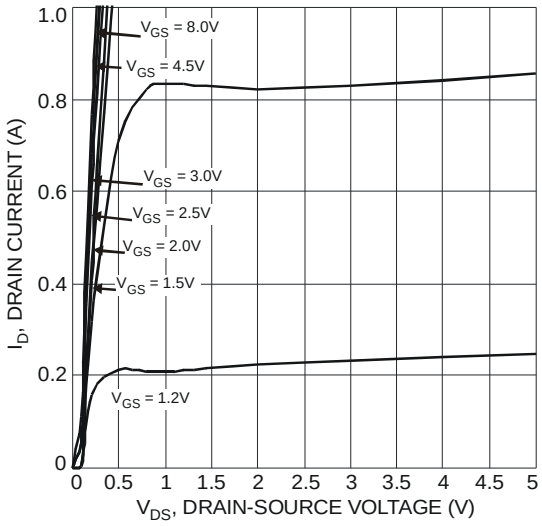


Fig. 1 Typical Output Characteristic

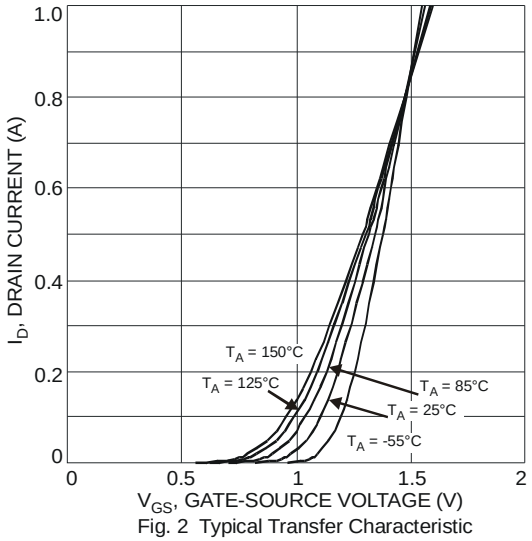


Fig. 2 Typical Transfer Characteristic

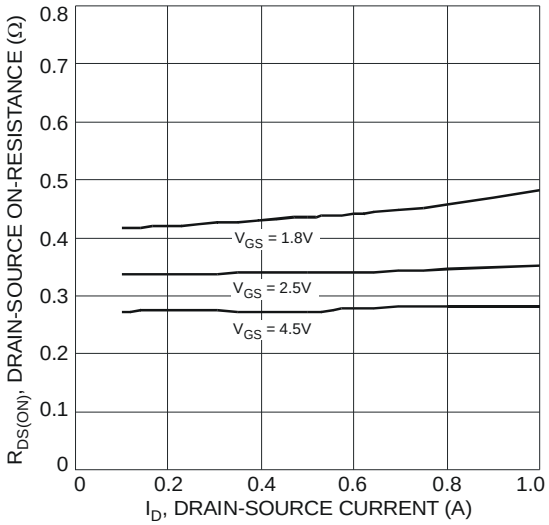


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

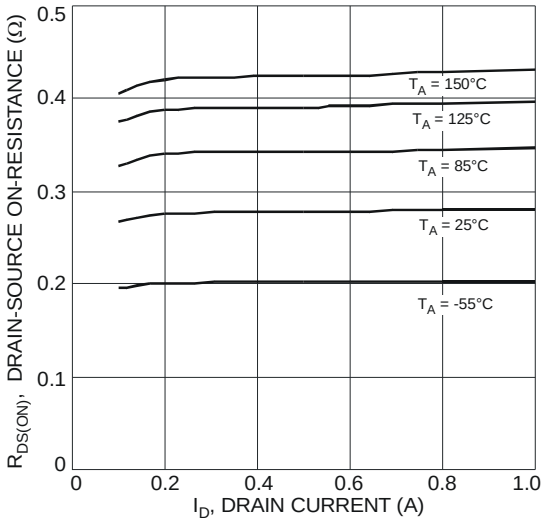


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

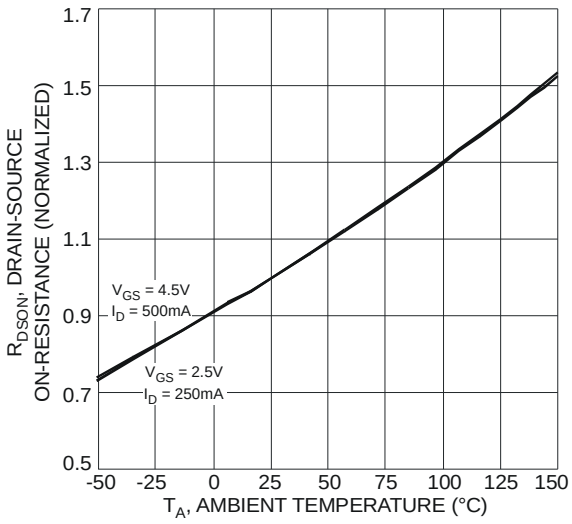


Fig. 5 On-Resistance Variation with Temperature

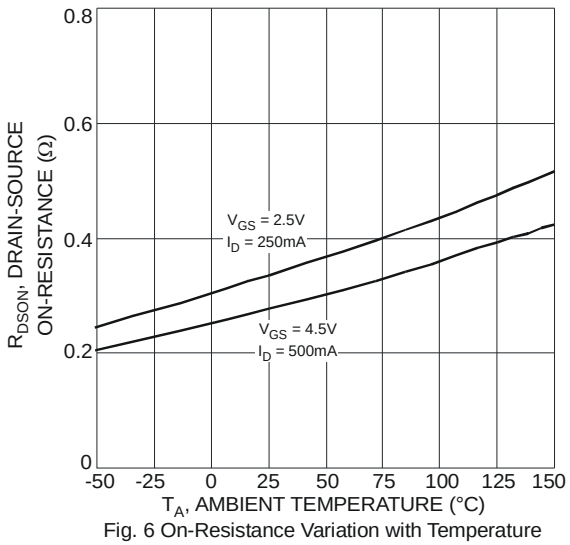


Fig. 6 On-Resistance Variation with Temperature

N-CHANNEL – Q1 (continued)

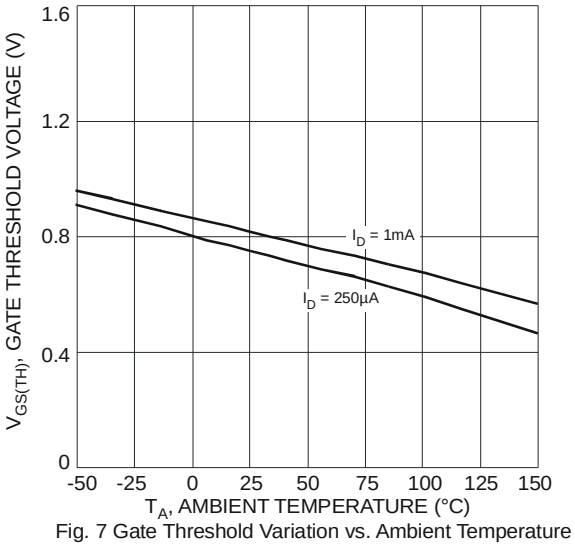


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

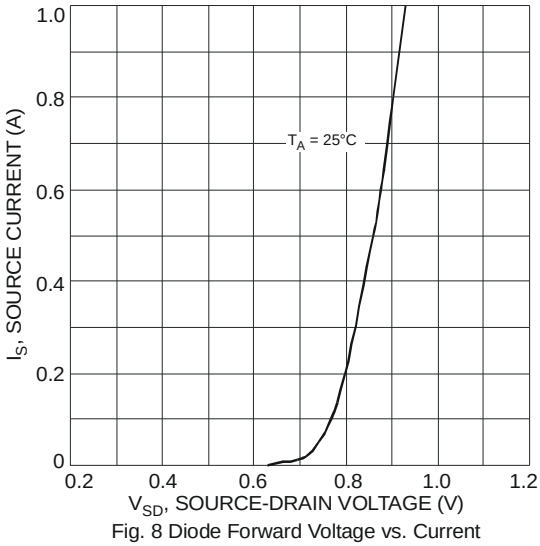


Fig. 8 Diode Forward Voltage vs. Current

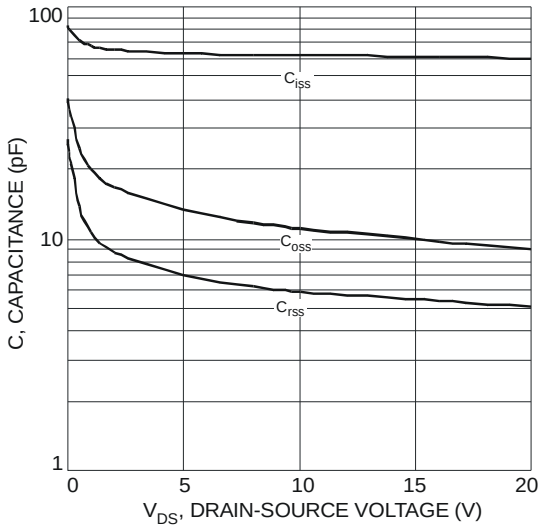


Fig. 9 Typical Total Capacitance

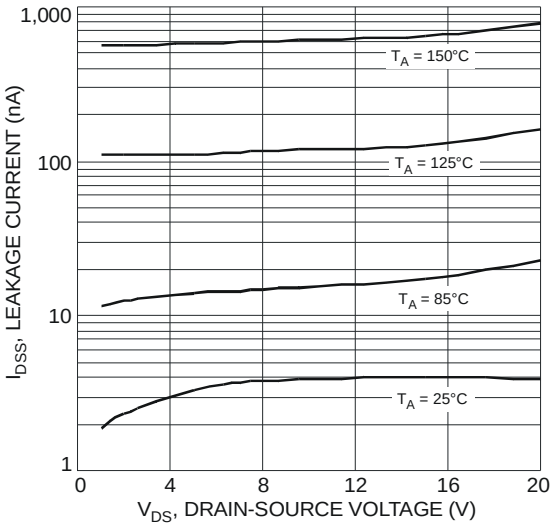


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

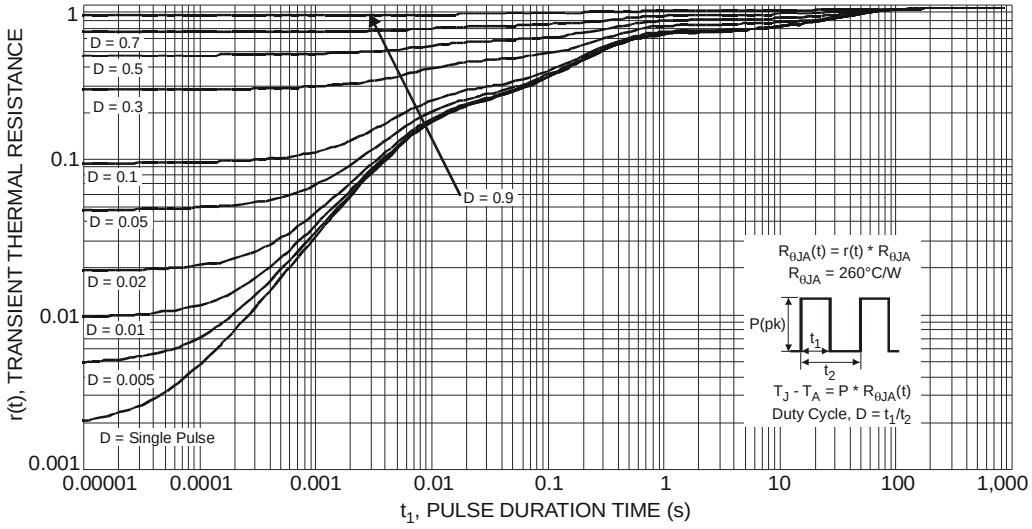


Fig. 11 Transient Thermal Response

Electrical Characteristics P-CHANNEL – Q2 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 5)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	-	-	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current @T_c = 25°C	I_{DSS}	-	-	-100	nA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±2.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 5)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.5	-	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	0.5	0.75	Ω	V_{GS} = -4.5V, I_D = -430mA
			0.7	1.05		V_{GS} = -2.5V, I_D = -300mA
			1.0	1.5		V_{GS} = -1.8V, I_D = -150mA
Forward Transfer Admittance	$\|Y_{fs}\|$	-	0.9	-	S	V_{DS} = -10V, I_D = -250mA
Diode Forward Voltage (Note 5)	V_{SD}	-	-0.8	-1.2	V	V_{GS} = 0V, I_S = -150mA
DYNAMIC CHARACTERISTICS (Note 6)						
Input Capacitance	C_{iss}	-	59.76	-	pF	V_{DS} = -16V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	12.07	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	6.36	-	pF	
Total Gate Charge (4.5V)	Q_g	-	622.4	-	pC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -250mA
Gate-Source Charge	Q_{gs}	-	100.3	-	pC	
Gate-Drain Charge	Q_{gd}	-	132.2	-	pC	
Turn-On Delay Time	$t_{D(on)}$	-	5.1	-	ns	V_{DS} = -10V, V_{GS} = -4.5V, R_G = 10Ω, R_L = 47Ω
Turn-On Rise Time	t_r	-	8.1	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	28.4	-	ns	
Turn-Off Fall Time	t_f	-	20.72	-	ns	

Notes: 5. Short duration pulse test used to minimize self-heating effect.
6. Guaranteed by design. Not subject to production testing

P-CHANNEL – Q2

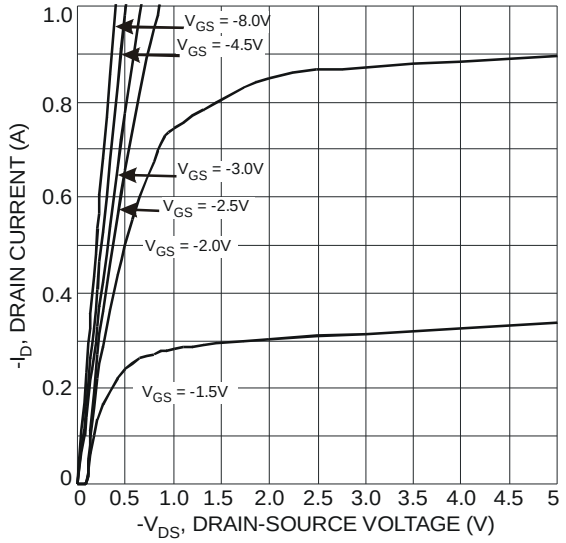


Fig. 12 Typical Output Characteristic

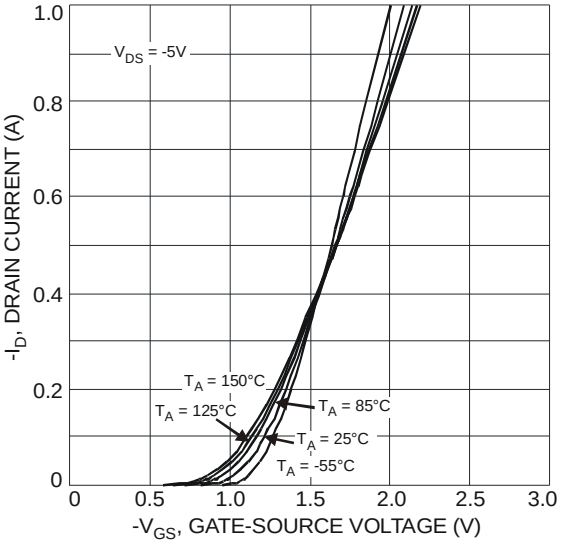


Fig. 13 Typical Transfer Characteristic

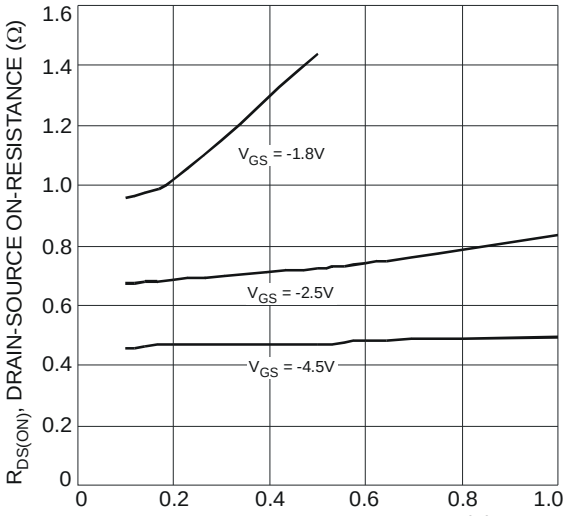


Fig. 14 Typical On-Resistance
vs. Drain Current and Gate Voltage

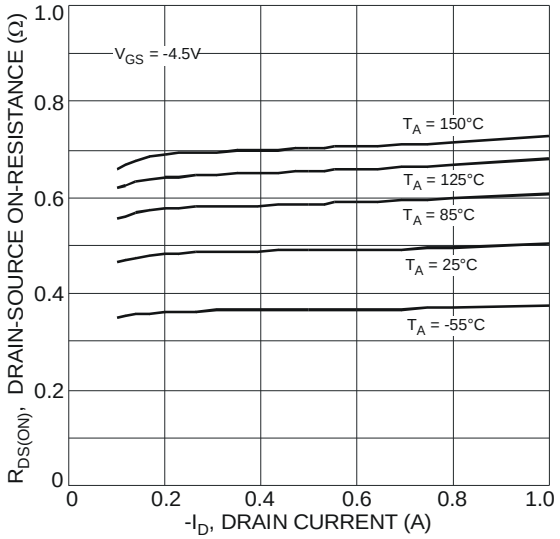


Fig. 15 Typical On-Resistance
vs. Drain Current and Temperature

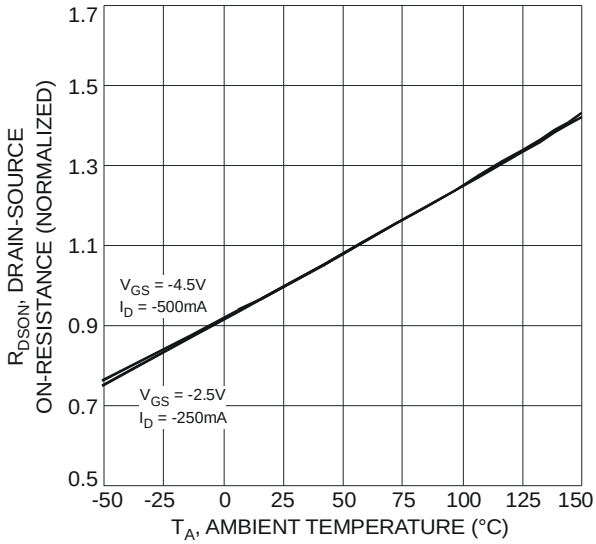


Fig. 16 On-Resistance Variation with Temperature

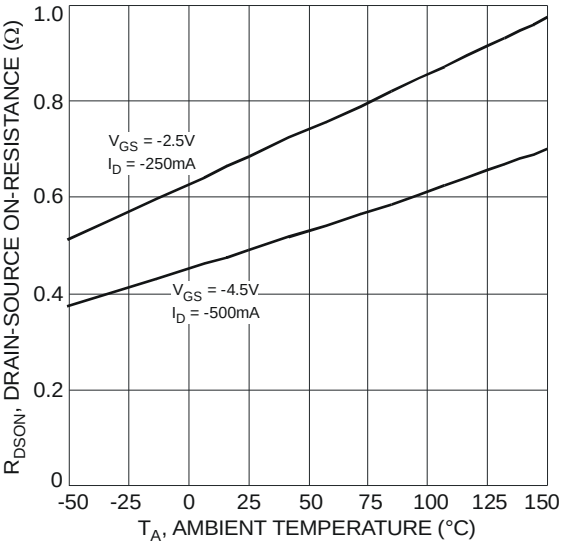


Fig. 17 On-Resistance Variation with Temperature

P-CHANNEL – Q2 (continued)

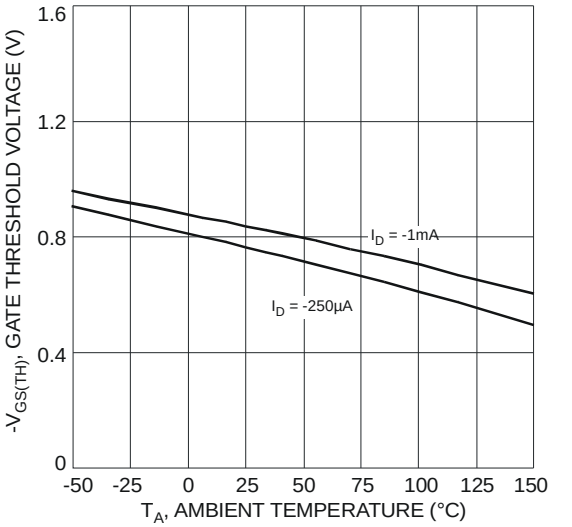


Fig. 18 Gate Threshold Variation vs. Ambient Temperature

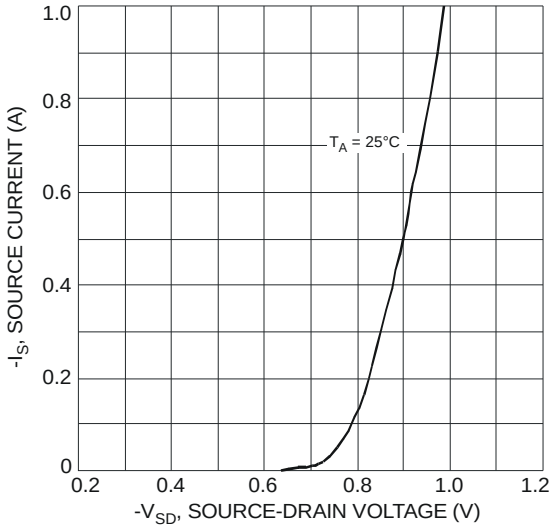


Fig. 19 Diode Forward Voltage vs. Current

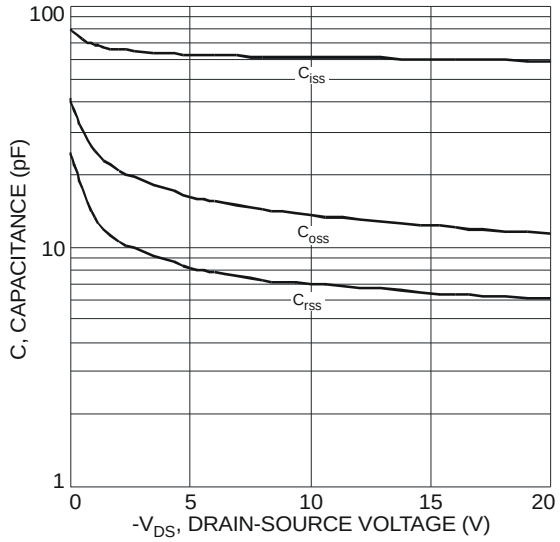


Fig. 20 Typical Total Capacitance

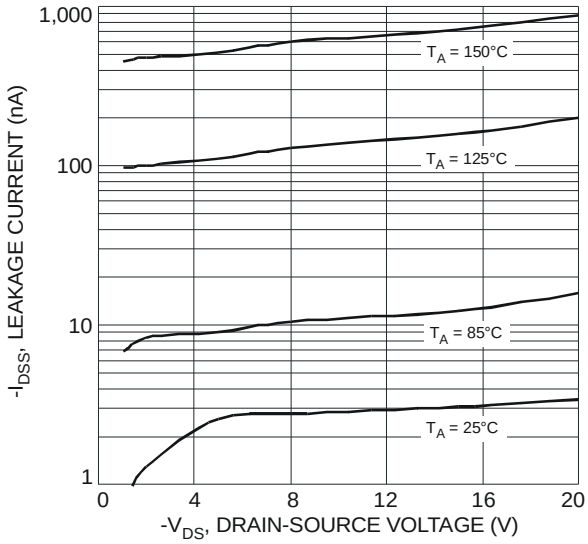


Fig. 21 Typical Leakage Current vs. Drain-Source Voltage

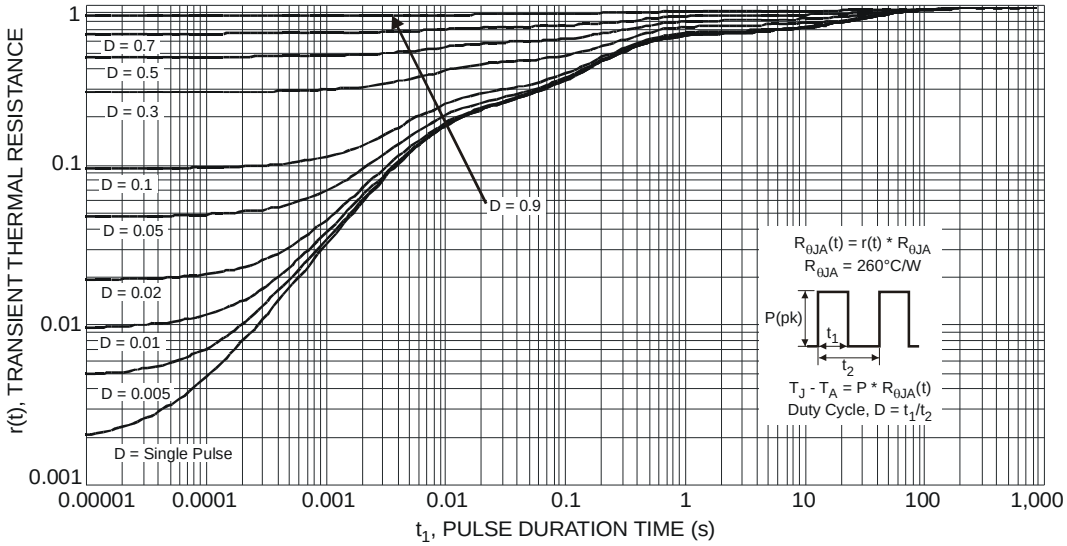
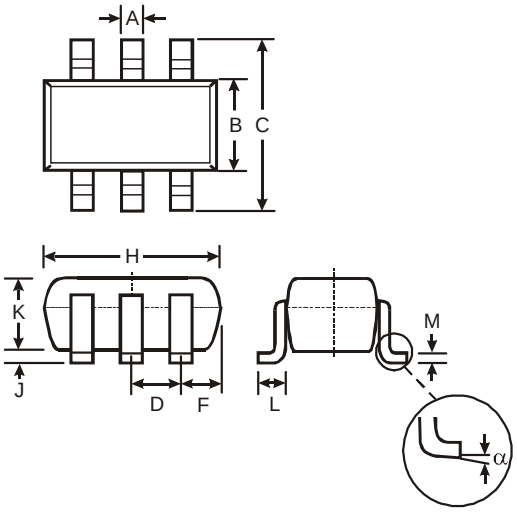


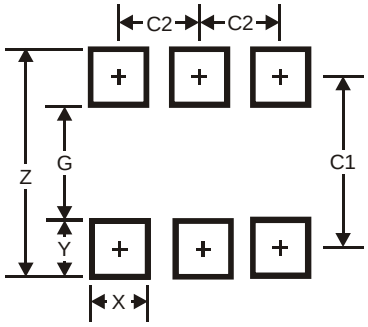
Fig. 22 Transient Thermal Response

Package Outline Dimensions



SOT-363		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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