

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**

**Product Summary**

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	Package	I <sub>D</sub> max T <sub>A</sub> = +25°C
Q1	30V	55mΩ @ V <sub>GS</sub> = 10V	TSOT26	3.8A
		65mΩ @ V <sub>GS</sub> = 4.5V	TSOT26	3.6A
Q2	-30V	110mΩ @ V <sub>GS</sub> = -10V	TSOT26	-2.5A
		142mΩ @ V <sub>GS</sub> = -4.5V	TSOT26	-2.1A

**Features**

- Complementary MOSFET
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **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**

**Description**

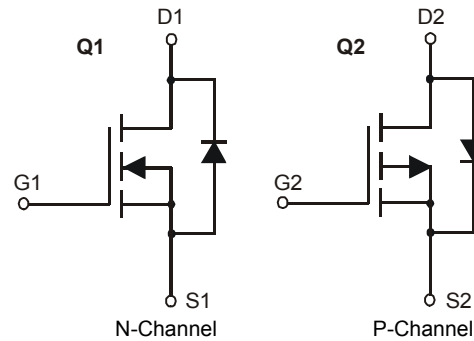
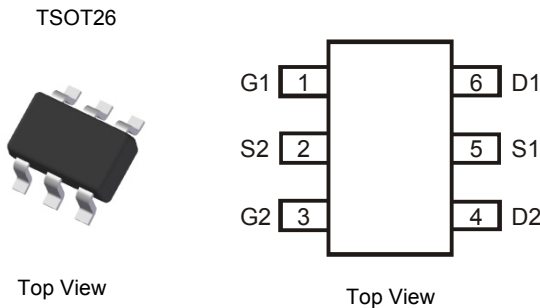
This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

- Backlighting
- Power Management Functions
- DC-DC Converters

**Mechanical Data**

- Case: TSOT26
- 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 — NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.008 grams (approximate)

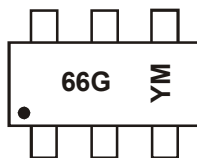


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMG6601LVT-7	TSOT26	3K/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**



66G = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: X = 2010)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017					
Code	Y	Z	A	B	C	D	E					
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 and Q2** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Q1	Q2	Units	
Drain-Source Voltage	$V_{DSS}$	30	-30	V	
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	$\pm 12$	V	
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	3.8 3.0	-2.5 -2	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	4.5 3.4	-3 -2.3	A
Maximum Body Diode Forward Current (Note 6)	$I_S$	1.5	-1.5	A	
Pulsed Drain Current (Note 6)	$I_{DM}$	20	-15	A	

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	$T_A = +25^\circ\text{C}$	0.85
		$T_A = +70^\circ\text{C}$	0.54
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	Steady state	147
		$t < 10\text{s}$	103
Total Power Dissipation (Note 6)	$P_D$	$T_A = +25^\circ\text{C}$	1.3
		$T_A = +70^\circ\text{C}$	0.83
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	Steady state	96
		$t < 10\text{s}$	67
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	36	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	-	-	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current @ $T_J = +25^\circ\text{C}$	$I_{DSS}$	-	-	1	$\mu\text{A}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	1	1.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	34	55	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 3.4\text{A}$
		-	38	65		$V_{GS} = 4.5\text{V}, I_D = 3\text{A}$
		-	49	85		$V_{GS} = 2.5\text{V}, I_D = 2\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	-	6	-	S	$V_{DS} = 5\text{V}, I_D = 3.4\text{A}$
Diode Forward Voltage (Note 7)	$V_{SD}$	-	0.75	1.0	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	-	422	-	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	41	-	pF	
Reverse Transfer Capacitance	$C_{rss}$	-	39	-	pF	
Gate resistance	$R_g$	-	1.26	-	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	-	5.4	-	nC	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 3.1\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	-	12.3	-	nC	
Gate-Source Charge	$Q_{gs}$	-	0.8	-	nC	
Gate-Drain Charge	$Q_{gd}$	-	1.2	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	1.6	-	ns	$V_{DS} = 15\text{V}, V_{GS} = 10\text{V}, R_L = 4.7\Omega, R_G = 3\Omega,$
Turn-On Rise Time	$t_r$	-	7.4	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	31.2	-	ns	
Turn-Off Fall Time	$t_f$	-	15.6	-	ns	

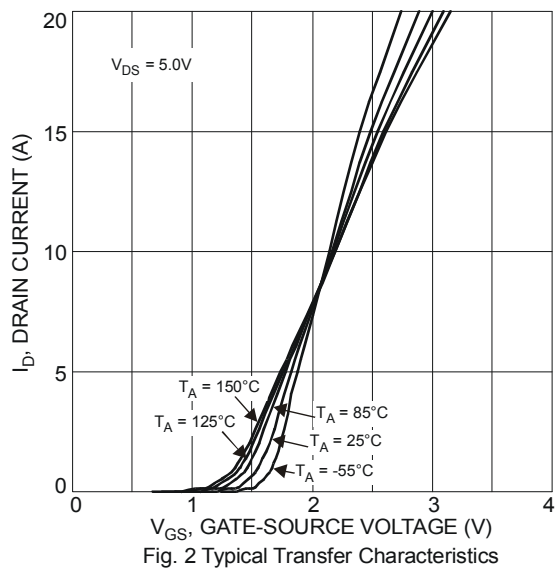
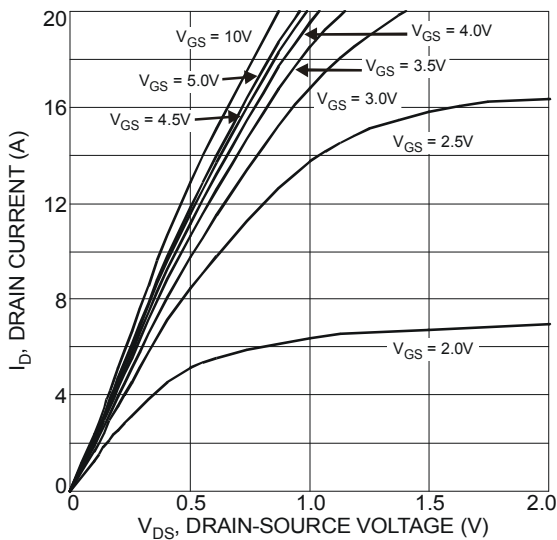
- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed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

**Electrical Characteristics - Q2** (@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>	-30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current @T <sub>J</sub> = +25°C	I <sub>DSS</sub>	-	-	-1	μA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4	-0.8	-1.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	70	110	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.3A
		-	81	142		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2A
		-	105	190		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1A
		-	-	-		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1A
Forward Transfer Admittance	Y <sub>fs</sub>	-	5.3	-	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -2.3A
Diode Forward Voltage (Note 7)	V <sub>SD</sub>	-	-0.8	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	-	541	-	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	46	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	43	-	pF	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Gate resistance	R <sub>g</sub>	-	16.9	-	Ω	
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	-	6.5	-	nC	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.3A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	-	13.8	-	nC	
Gate-Source Charge	Q <sub>gs</sub>	-	1.0	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	1.6	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	1.7	-	ns	V <sub>DS</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>L</sub> = 6Ω, R <sub>G</sub> = 3Ω,
Turn-On Rise Time	t <sub>r</sub>	-	4.6	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	18.3	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	2.2	-	ns	

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

**N Channel - Q1**



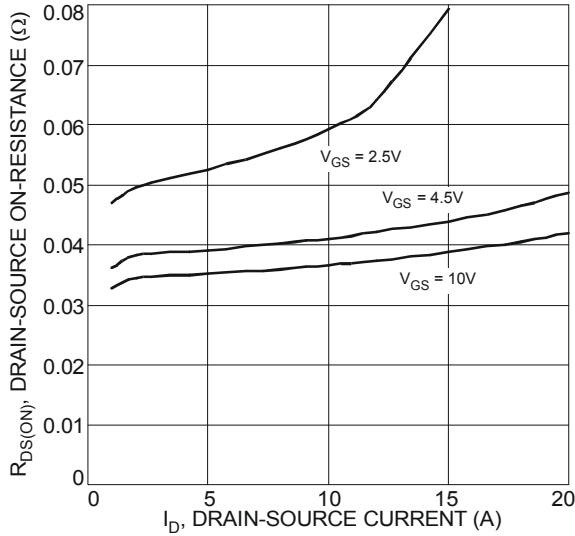


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

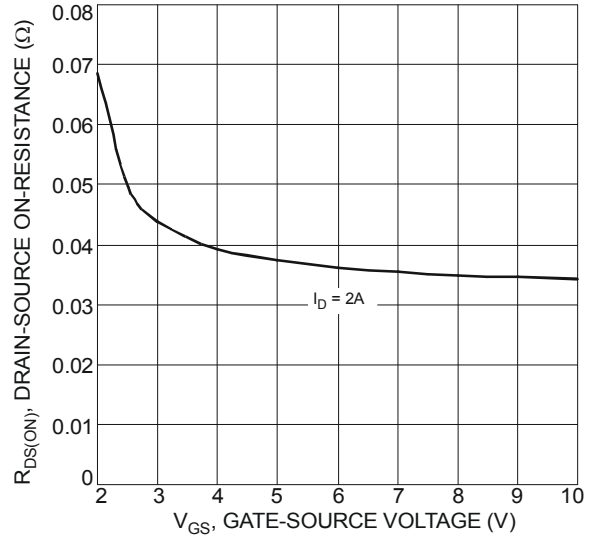


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

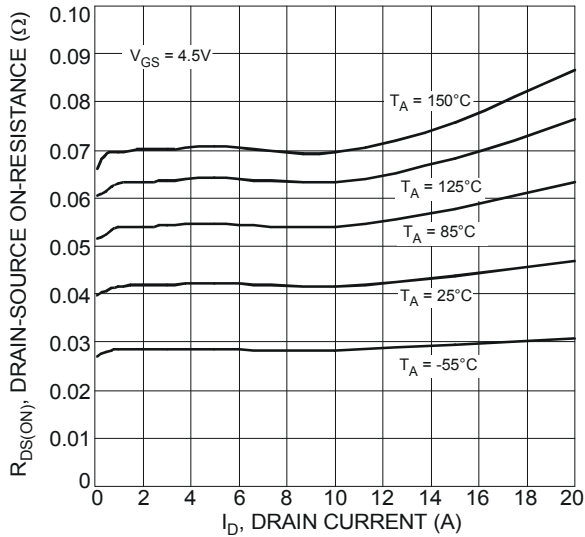


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

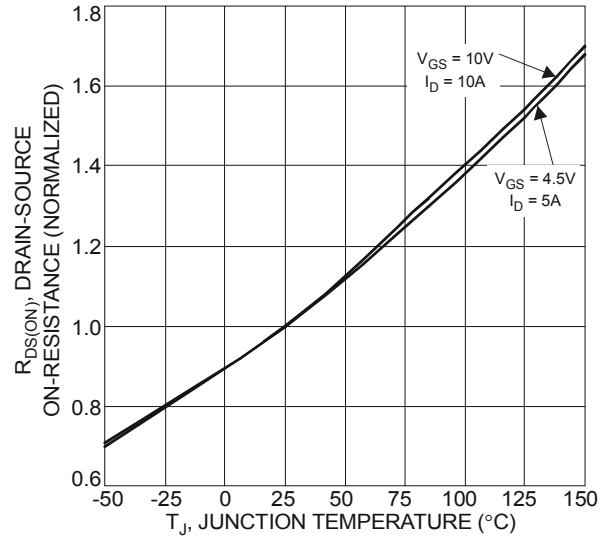


Fig. 6 On-Resistance Variation with Temperature

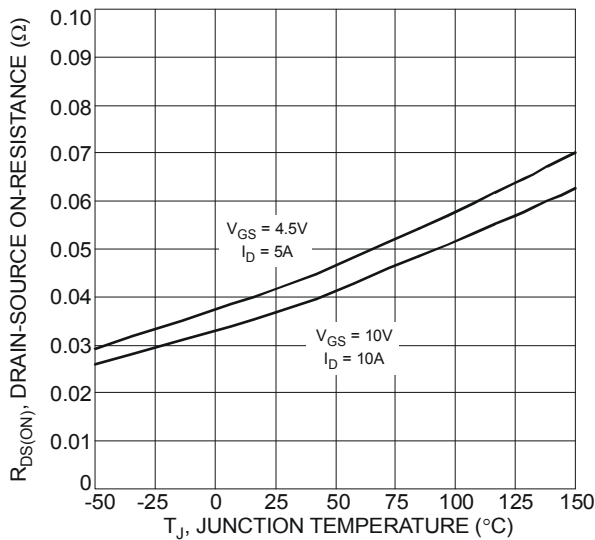


Fig. 7 On-Resistance Variation with Temperature

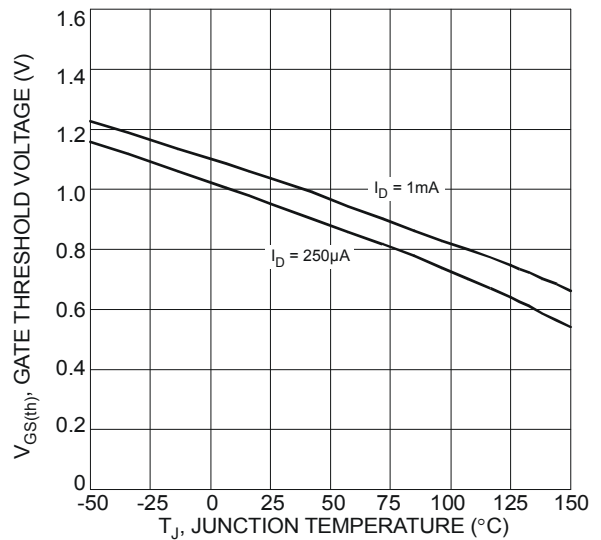


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

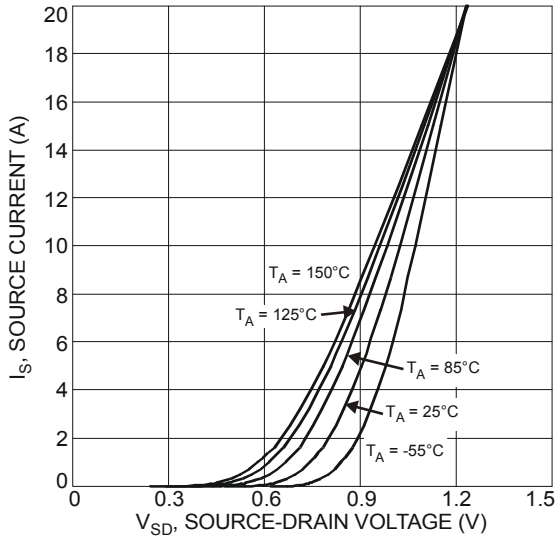


Fig. 9 Diode Forward Voltage vs. Current

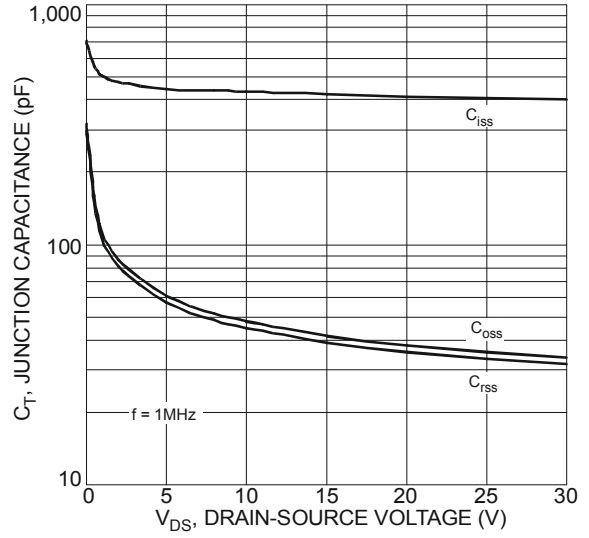


Fig. 10 Typical Junction Capacitance

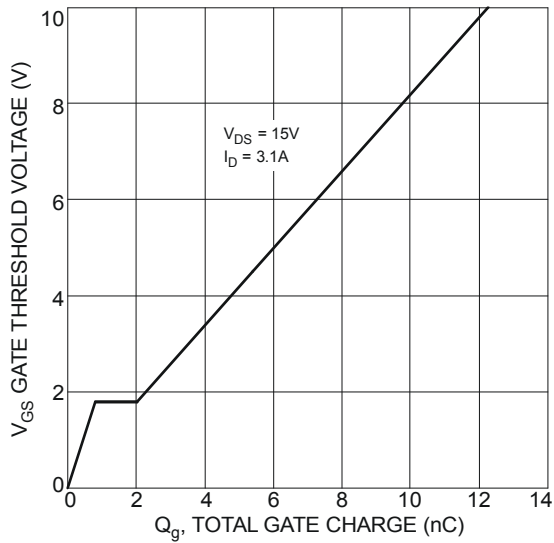


Fig. 11 Gate Charge

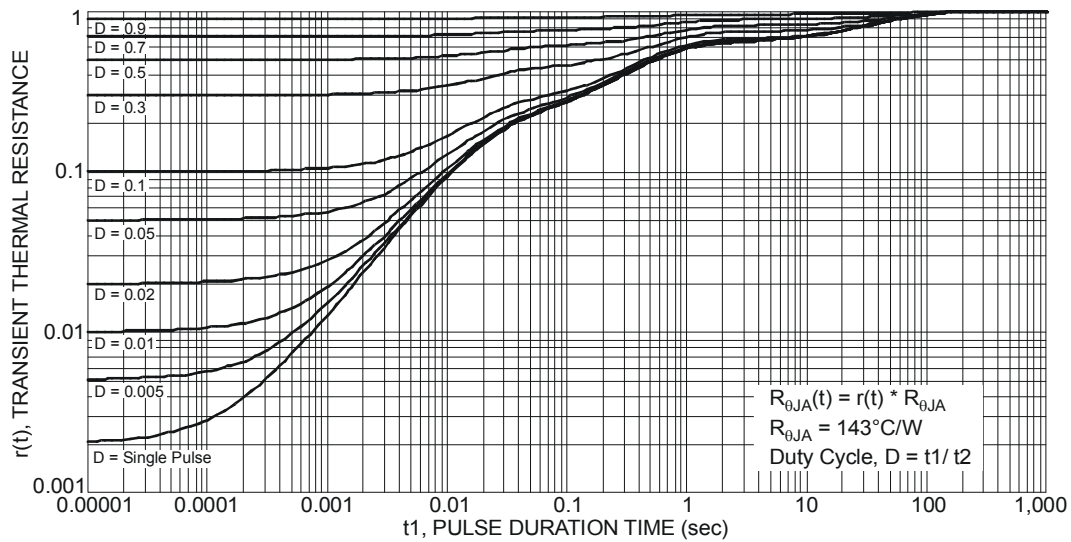


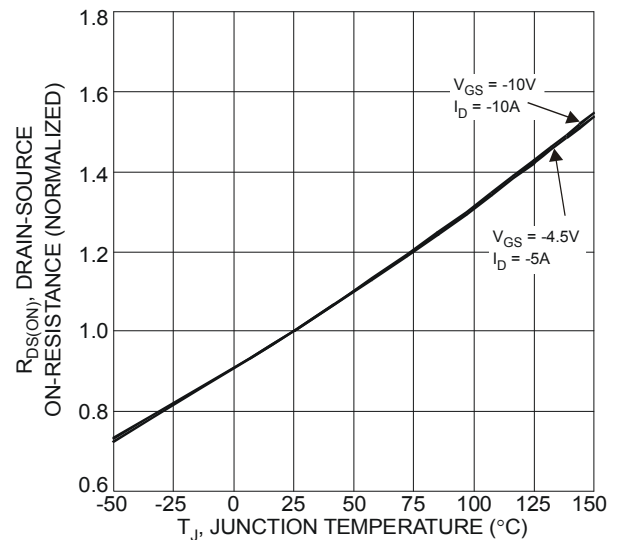
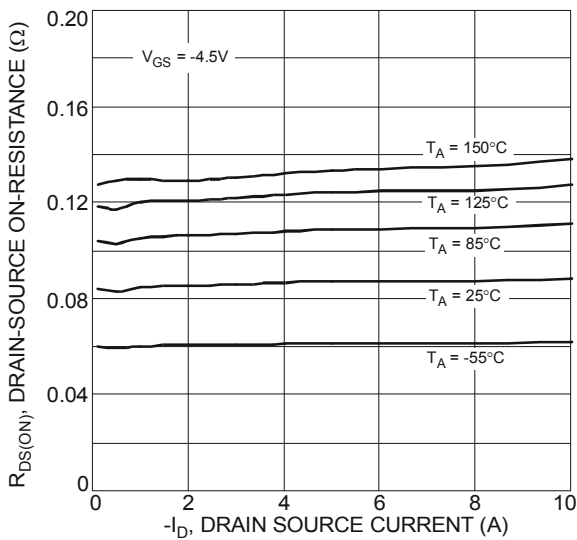
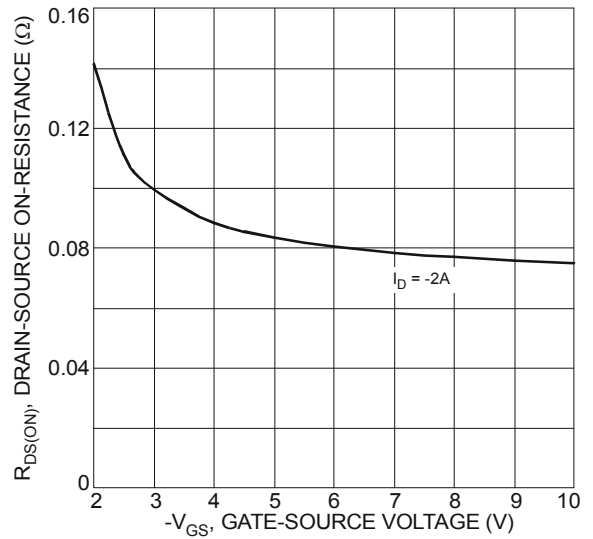
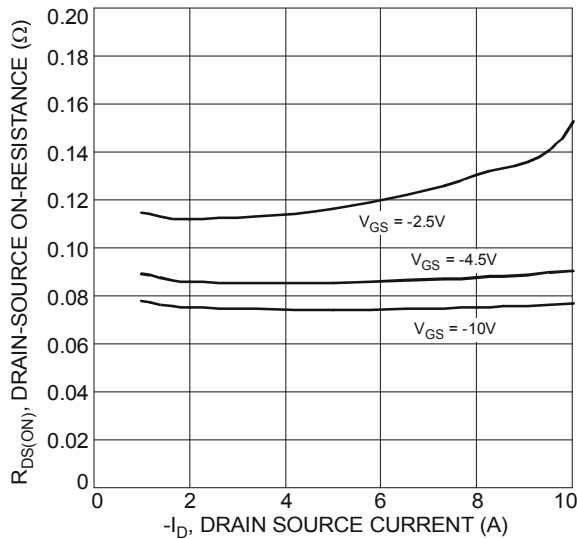
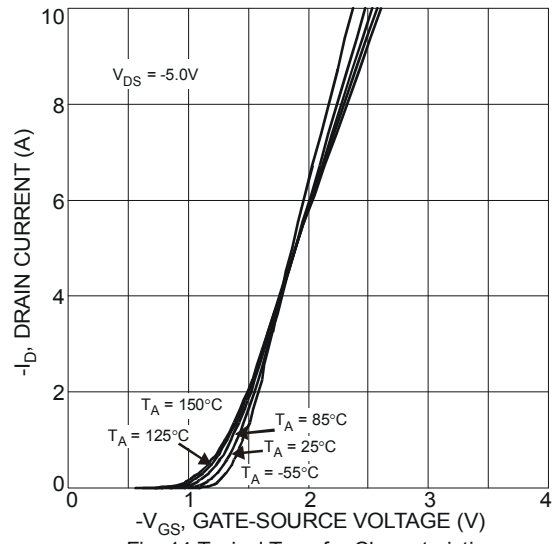
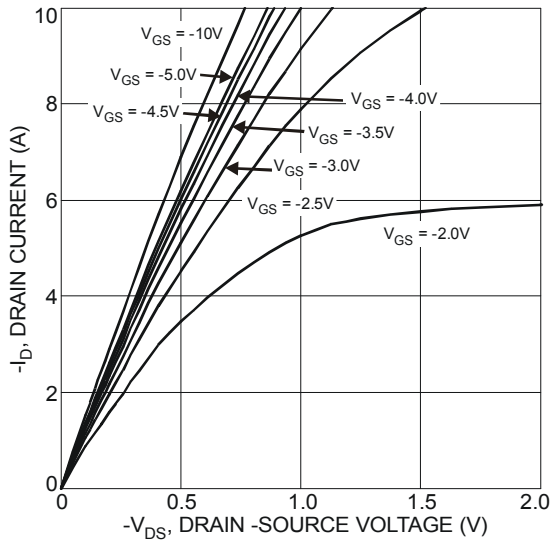
Fig. 12 Transient Thermal Resistance

$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 143^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1 / t_2$$

**P Channel - Q2**



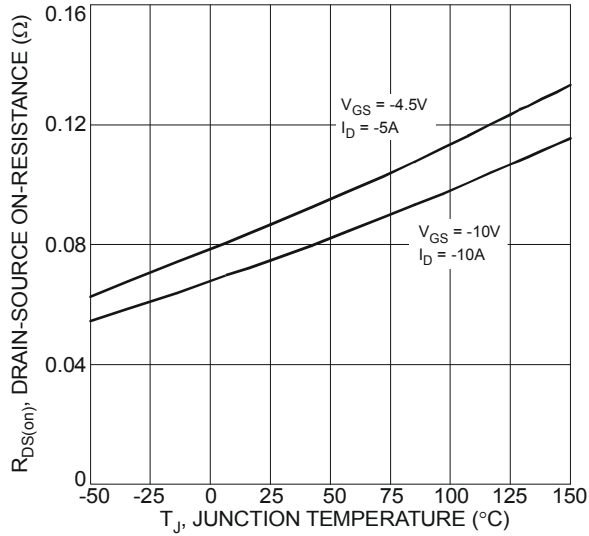


Fig. 19 On-Resistance Variation with Temperature

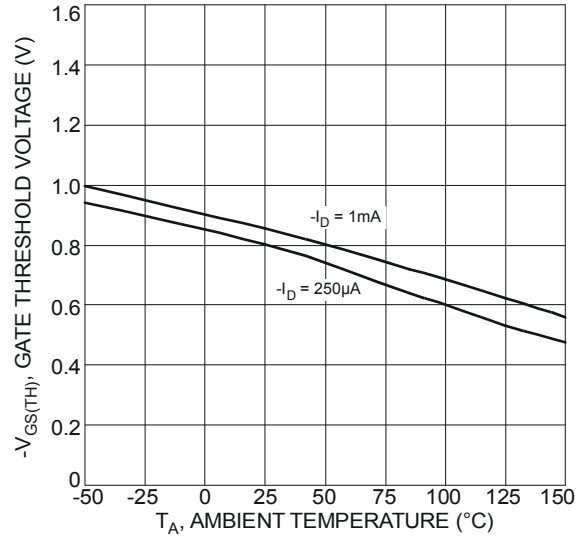


Fig. 20 Gate Threshold Variation vs. Ambient Temperature

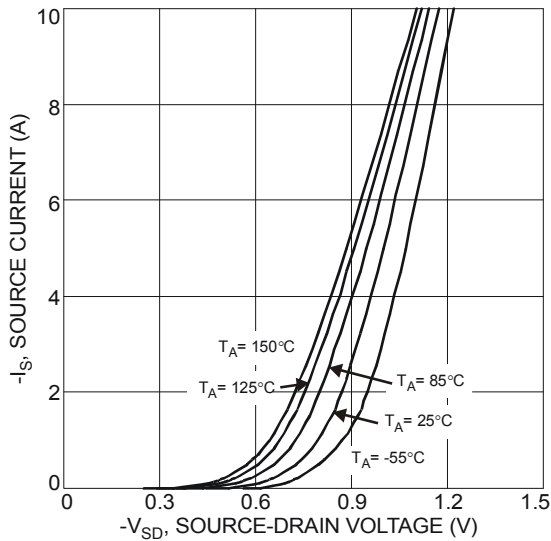


Fig. 21 Diode Forward Voltage vs. Current

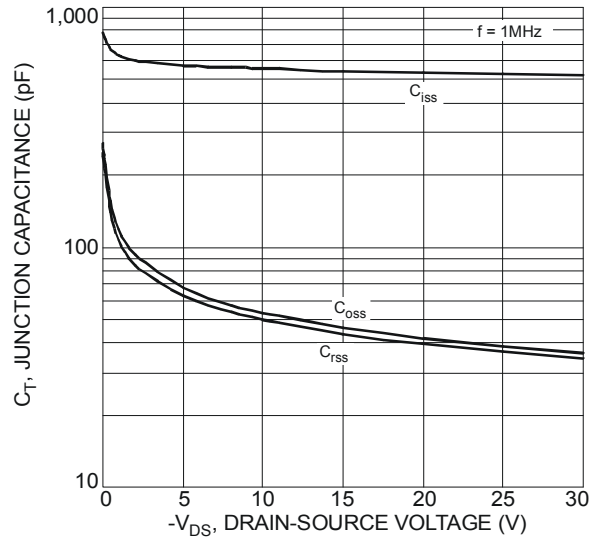


Fig. 22 Typical Junction Capacitance

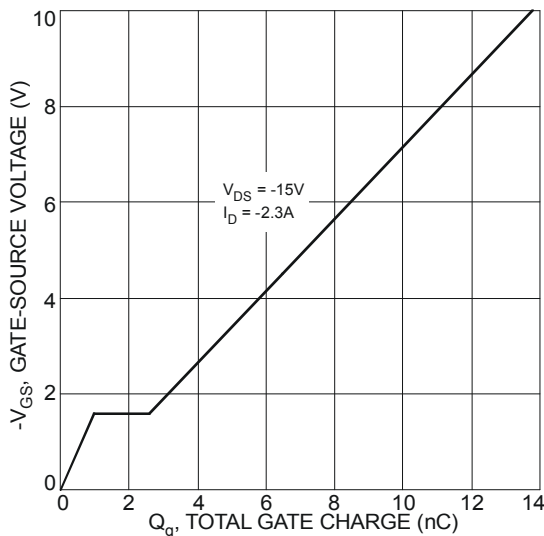
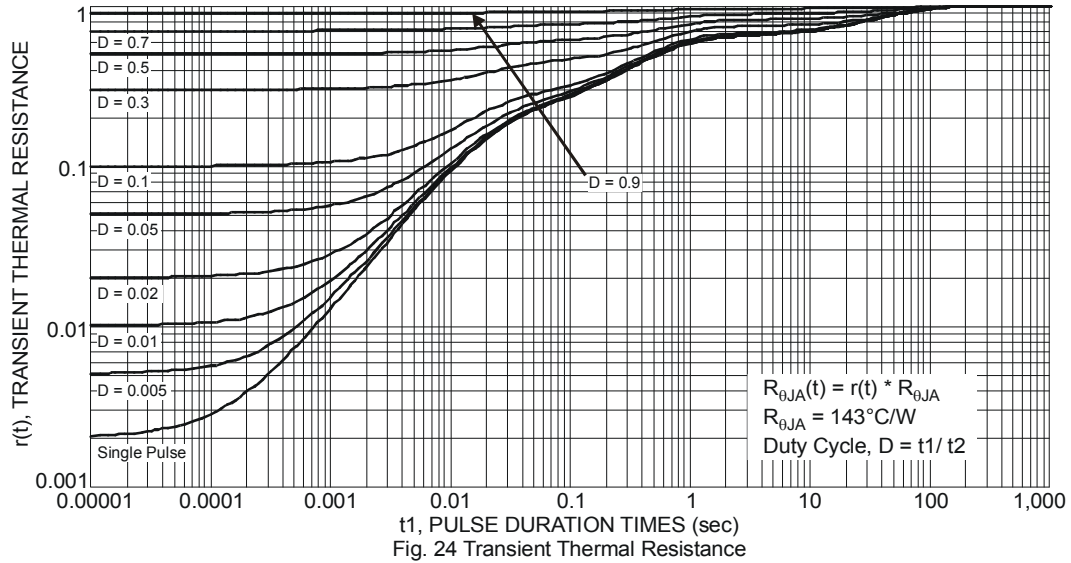
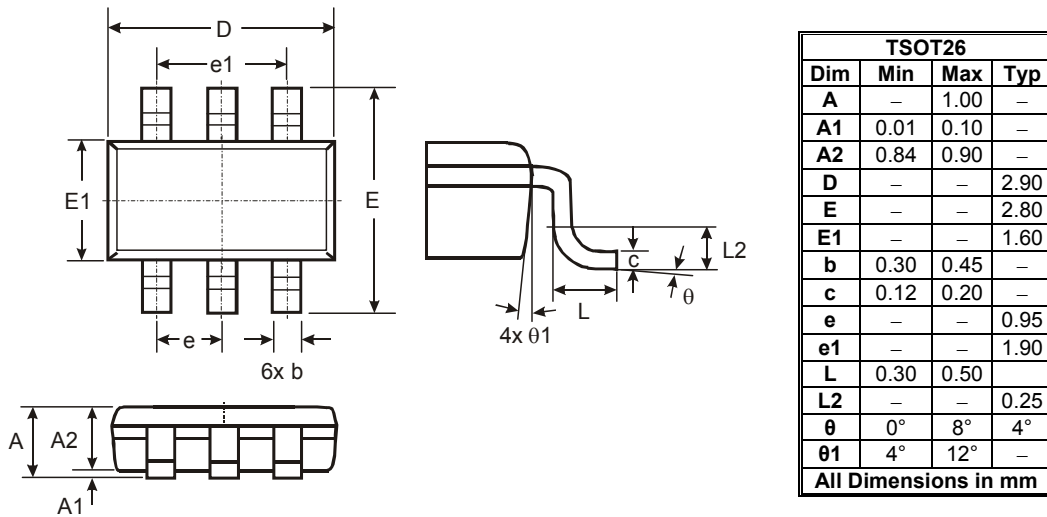


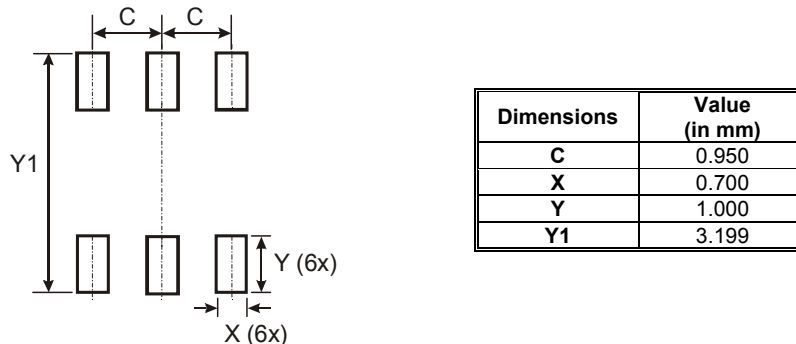
Fig. 23 Gate-Charge Characteristics



**Package Outline Dimensions**



**Suggested Pad Layout**





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