



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



企业QQ二维码

Product Summary

Device	BV _{bss}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1	60V	1.7Ω @ V _{GS} = 10V	480mA
		3Ω @ V _{GS} = 4.5V	360mA
Q2	-60V	4Ω @ V _{GS} = -10V	-320mA
		6Ω @ V _{GS} = -4.5V	-260mA

Features and Benefits

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

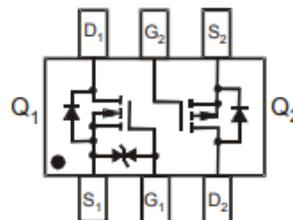
Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- General-purpose interfacing switches
- Power management functions
- Analog switches

Mechanical Data

- Package: SOT563
- Package 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)



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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	480 380	mA
Maximum Body Diode Forward Current (Note 5)			I_S	480	mA
Pulsed Drain Current (Note 5)			I_{DM}	1.3	A
Pulsed Source Current (Note 5)			I_{SM}	1.3	A

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-60	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 5) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-320 -250	mA
Maximum Body Diode Forward Current (Note 5)			I_S	-320	mA
Pulsed Drain Current (Note 5)			I_{DM}	-1	A
Pulsed Source Current (Note 5)			I_{SM}	-1	A

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

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 6)			P_D	0.5	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	261	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)			P_D	0.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		$R_{\theta JA}$	158	$^\circ\text{C/W}$
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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

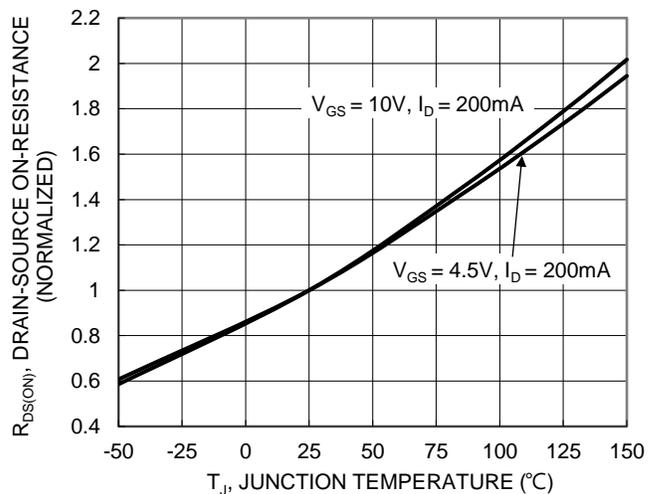
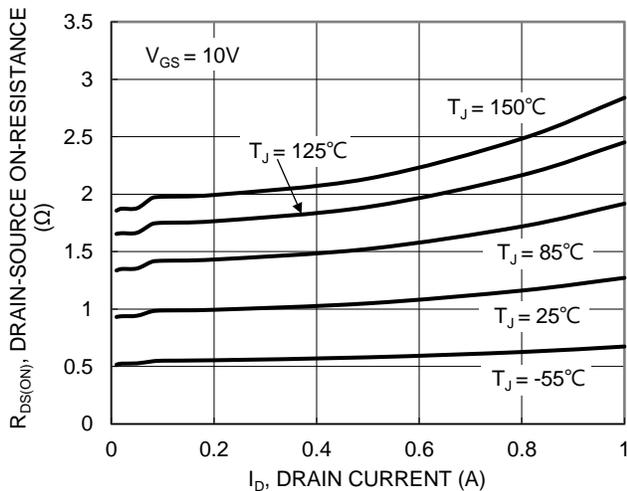
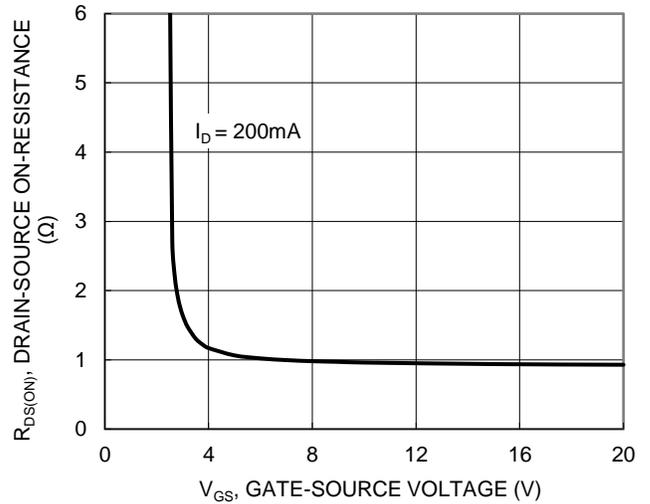
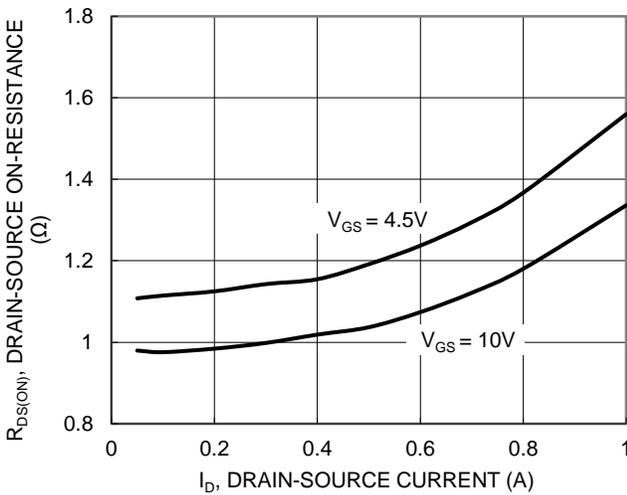
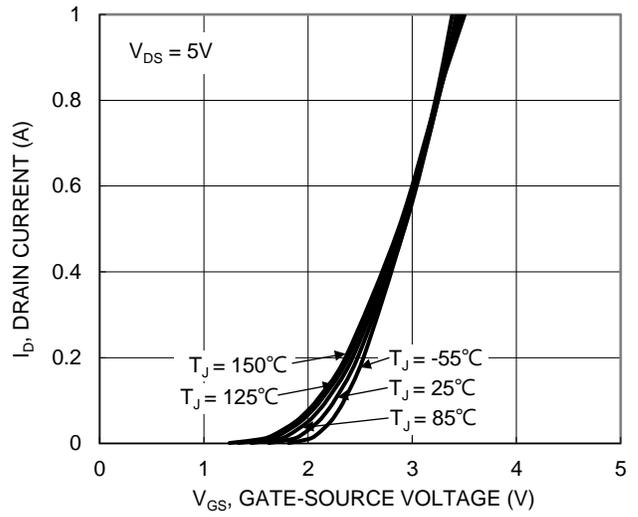
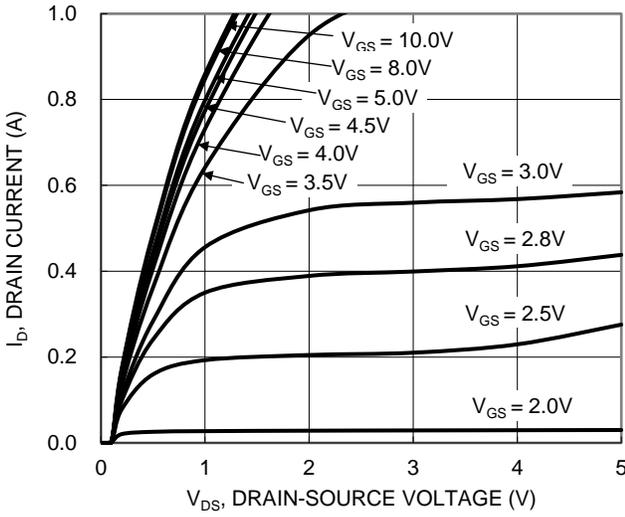
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
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)}	—	1.0	1.7	Ω	V _{GS} = 10V, I _D = 200mA
		—	1.2	3		V _{GS} = 4.5V, I _D = 200mA
Diode Forward Voltage	V _{SD}	—	0.85	1.4	V	V _{GS} = 0V, I _S = 115mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	41	—	pF	V _{DS} = 30V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	4.5	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	2.7	—	pF	
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	0.51	—	nC	V _{DS} = 15V, I _D = 200mA
Total Gate Charge (V _{GS} = 10V)	Q _g	—	1.04	—	nC	
Gate-Source Charge	Q _{gs}	—	0.16	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.18	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	6.9	—	ns	V _{DD} = 30V, V _{GS} = 10V R _G = 150Ω, I _D = 200mA
Turn-On Rise Time	t _R	—	5.8	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	37.8	—	ns	
Turn-Off Fall Time	t _F	—	14.3	—	ns	
Reverse Recovery Time	t _{RR}	—	19	—	ns	
Reverse Recovery Charge	Q _{RR}	—	9	—	nC	I _F = 1A, dI/dt = 100A/μs

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1.0	μA	V _{DS} = -60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	-1	—	-3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	1.8	4	Ω	V _{GS} = -10V, I _D = -200mA
		—	2.3	6		V _{GS} = -4.5V, I _D = -200mA
Diode Forward Voltage	V _{SD}	—	-0.8	-1.4	V	V _{GS} = 0V, I _S = -115mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	40	—	pF	V _{DS} = -25V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	5	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	3	—	pF	
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	0.5	—	nC	V _{DS} = -10V, I _D = -0.1A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	1.1	—	nC	
Gate-Source Charge	Q _{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.1	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	4	—	ns	V _{DD} = -30V, V _{GS} = -10V R _G = 50Ω, I _D = -270mA
Turn-On Rise Time	t _R	—	4	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	39.7	—	ns	
Turn-Off Fall Time	t _F	—	13.8	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	26.6	—	ns	
Body Diode Reverse Recovery Charge	Q _{RR}	—	16.3	—	nC	I _F = -1A, dI/dt = 100A/μs

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

N-CHANNEL – Q1



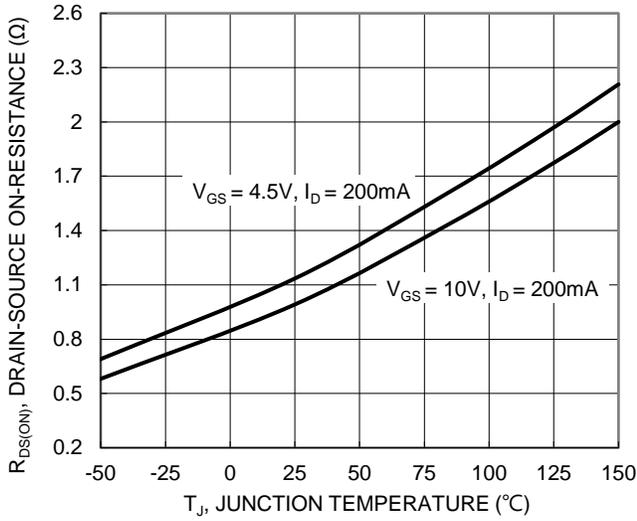


Figure 7. On-Resistance Variation with Junction Temperature

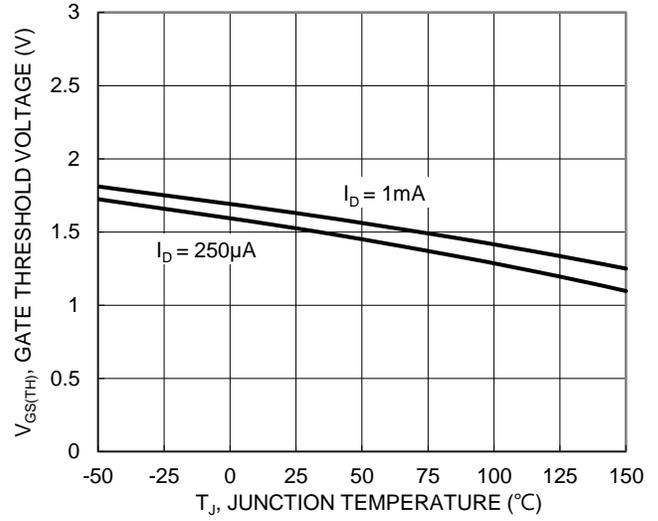


Figure 8. Gate Threshold Variation vs. Junction Temperature

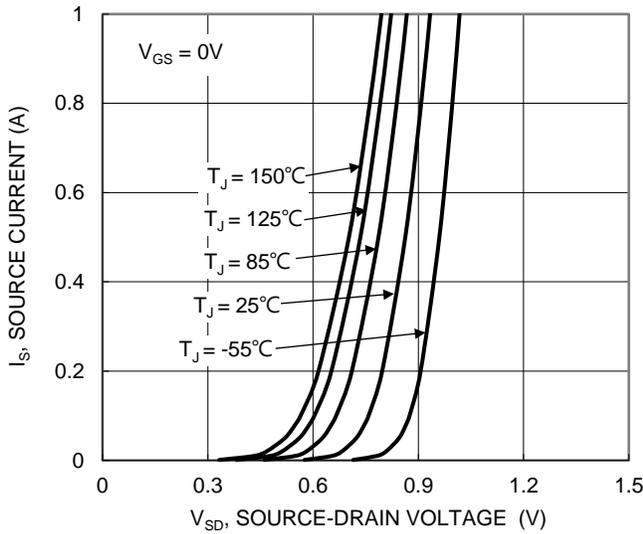


Figure 9. Diode Forward Voltage vs. Current

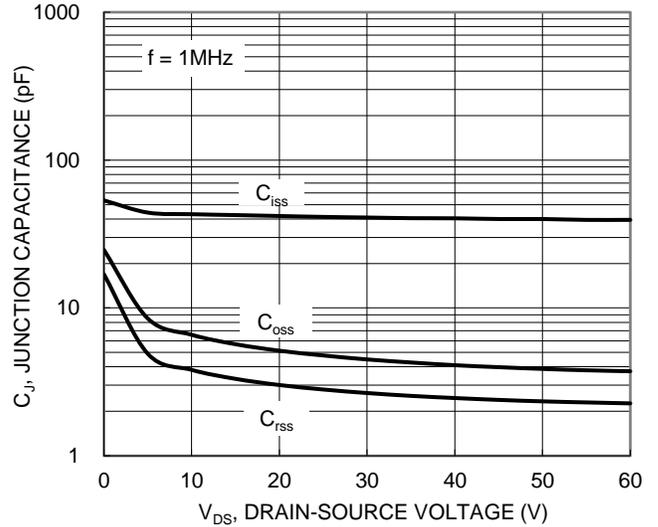


Figure 10. Typical Junction Capacitance

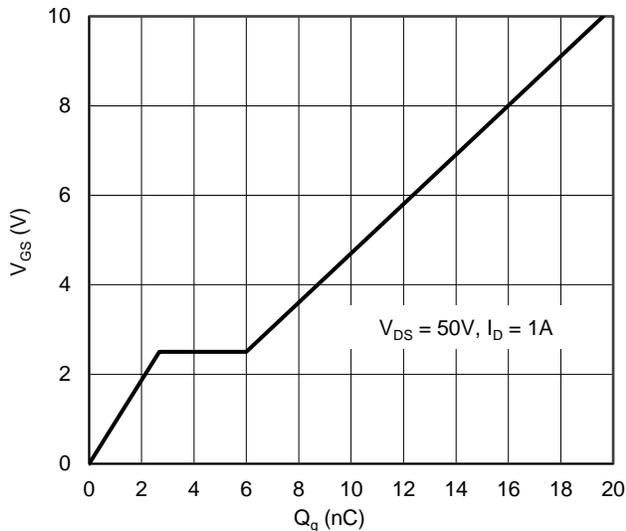


Figure 11. Gate Charge

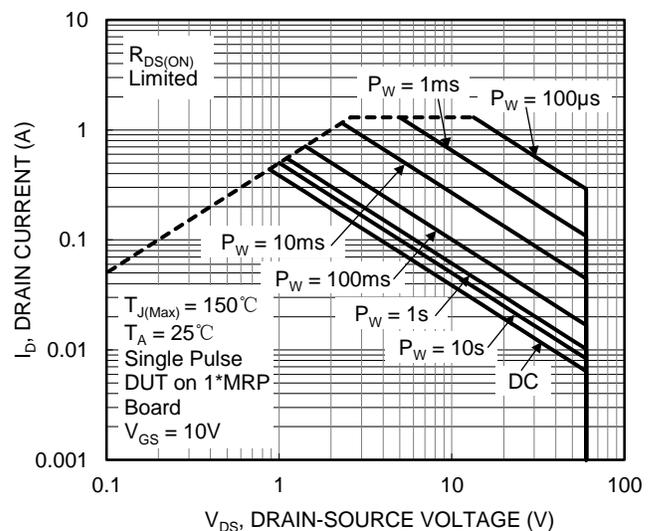


Figure 12. SOA, Safe Operation Area

P-CHANNEL – Q2

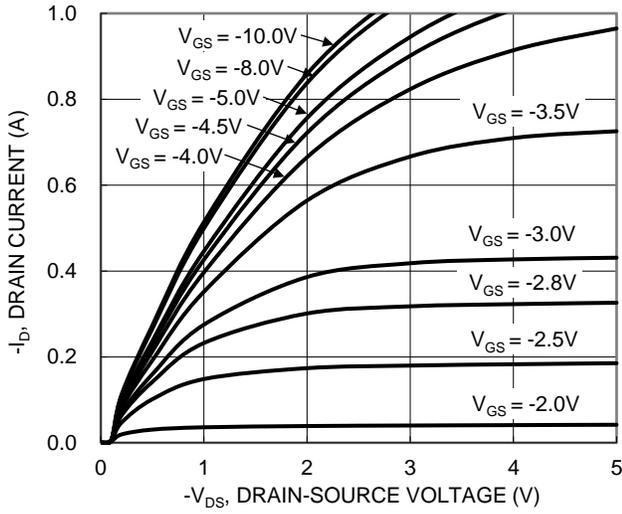


Figure 13. Typical Output Characteristic

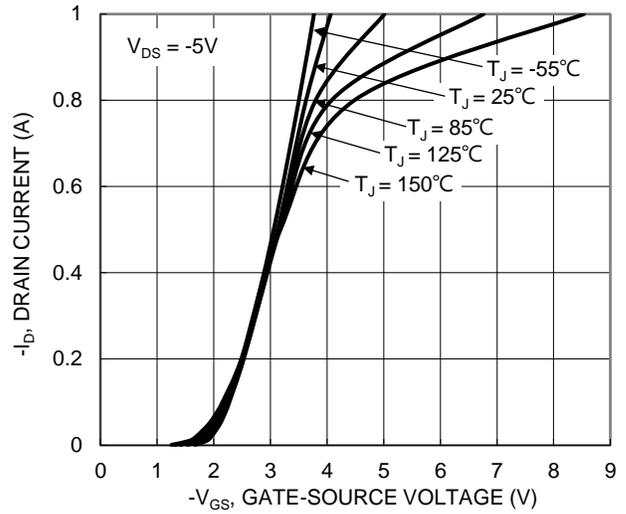


Figure 14. Typical Transfer Characteristic

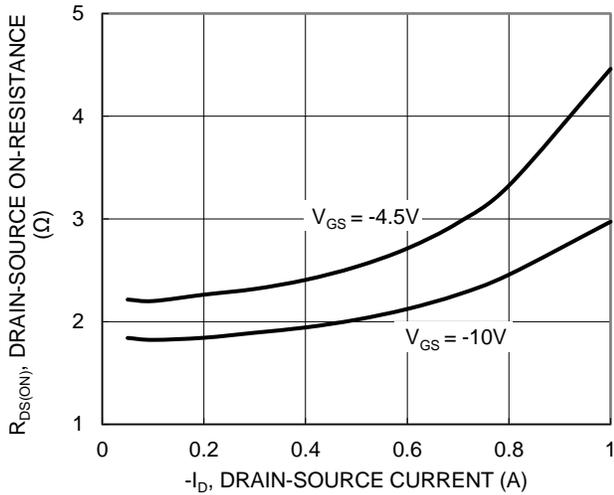


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

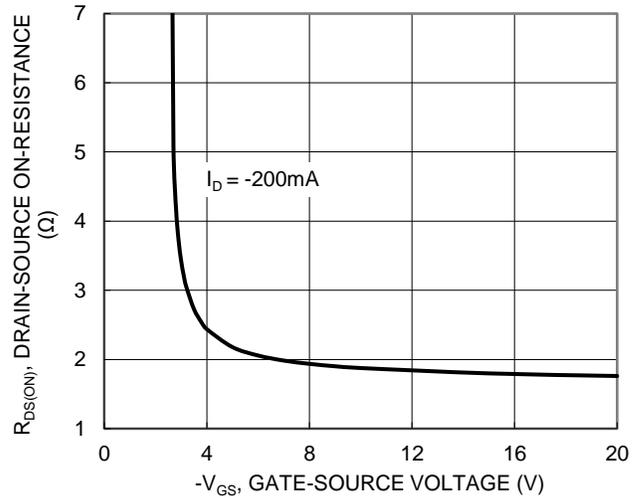


Figure 16. Typical Transfer Characteristic

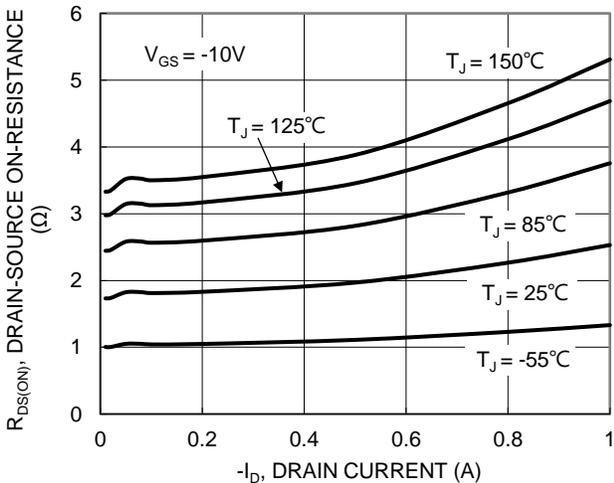


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

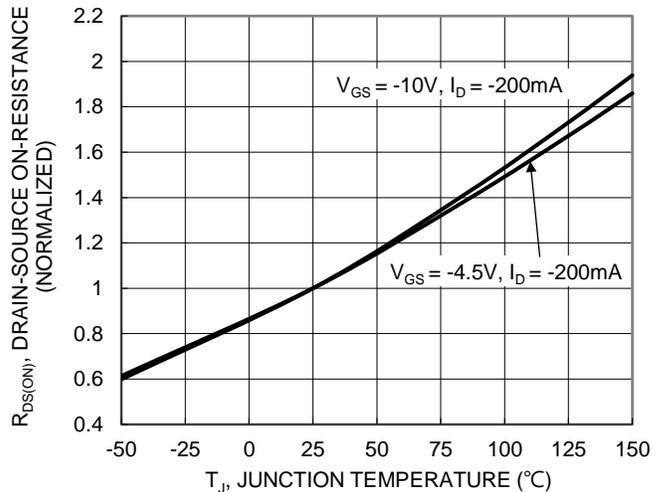
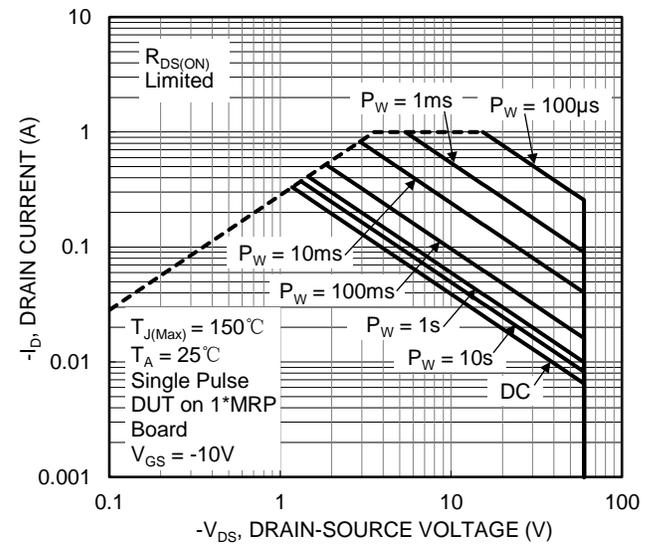
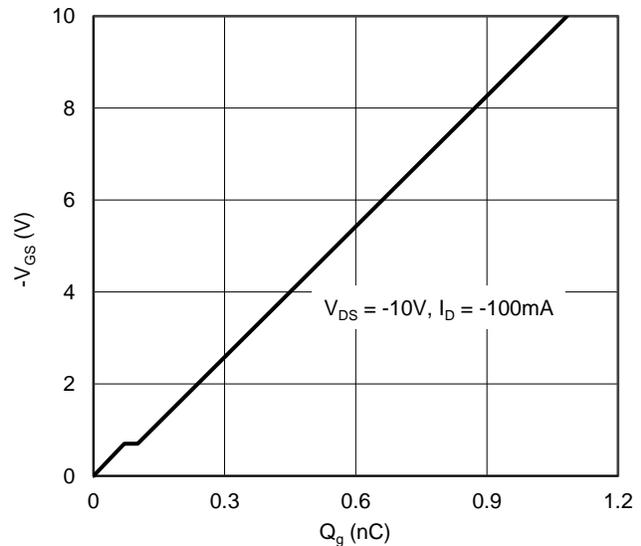
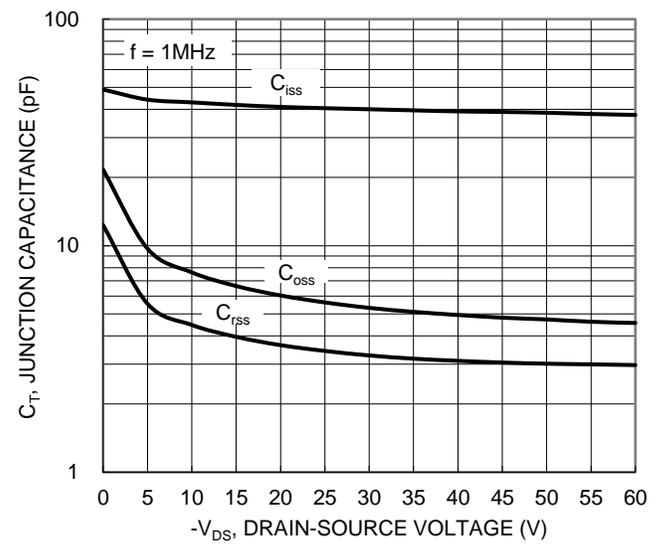
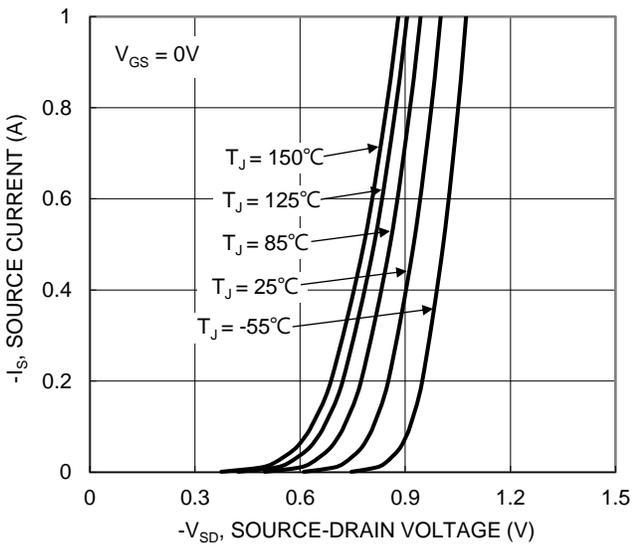
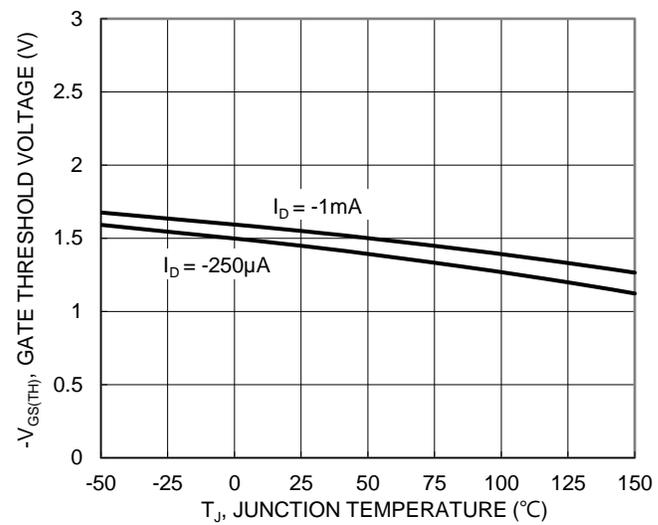
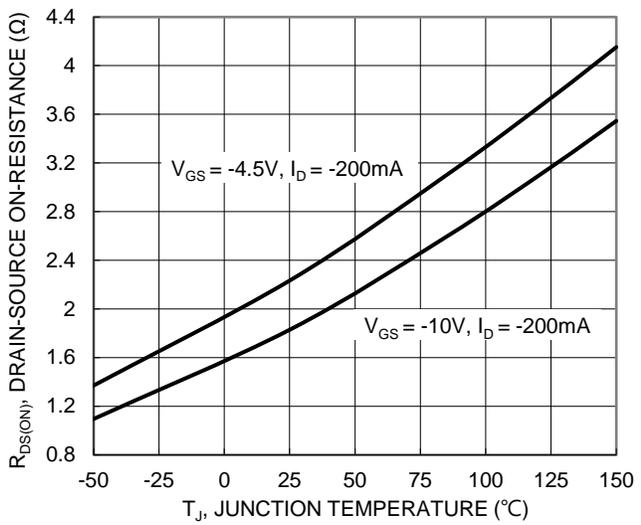


Figure 18. On-Resistance Variation with Junction Temperature



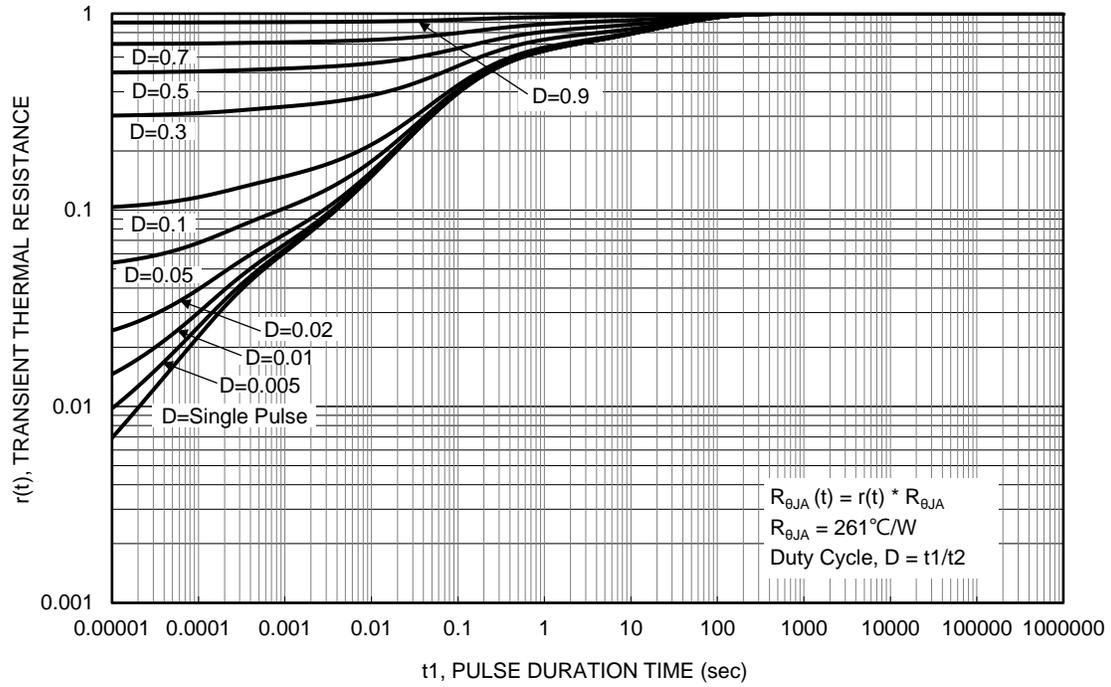
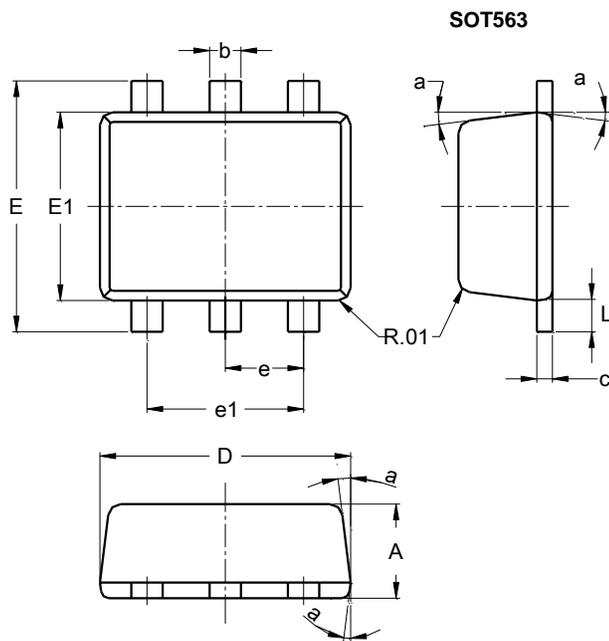


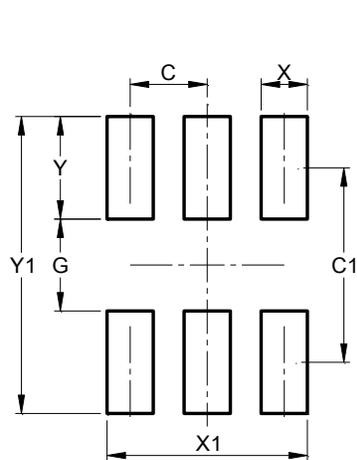
Figure 25. Transient Thermal Resistance

Package Outline Dimensions



SOT563			
Dim	Min	Max	Typ
A	0.55	0.60	--
b	0.15	0.30	0.20
c	0.10	0.18	0.11
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	--	--	0.50
e1	0.90	1.10	1.00
L	0.10	0.30	0.20
a	8°	9°	7°
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.500
C1	1.270
G	0.600
X	0.300
X1	1.300
Y	0.670
Y1	1.940