



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 _{DSS}	R _{DS(ON)}	I _D @T _A = +25°C
Q1	20V	0.4Ω @ V _{GS} = 4.5V	1.1A
		0.5Ω @ V _{GS} = 2.5V	1.0A
Q2	-20V	0.7Ω @ V _{GS} = -4.5V	-0.8A
		0.9Ω @ V _{GS} = -2.5V	-0.7A

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
N-Channel: V_{GS(TH)} < 1V
P-Channel: V_{GS(TH)} < -1V
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Ultra-Small Surface Mount Package

Description

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

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

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: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (Approximate)



ESD PROTECTED

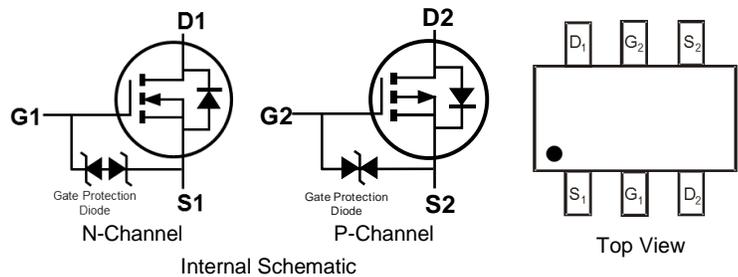
SOT563



Top View



Bottom View



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

Characteristic			Symbol	Q1 Value	Q2 Value	Unit
Drain-Source Voltage			V_{DS}	20	-20	V
Gate-Source Voltage			V_{GS}	± 6	± 6	V
Continuous Drain Current (Note 6) N-Channel: $V_{GS} = 4.5\text{V}$ P-Channel: $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	1.1	-0.8	A
		$T_A = +70^\circ\text{C}$		0.9	-0.7	
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	0.9	-0.9	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	5	-3	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	0.46	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	274	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	0.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	152	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DS}	20	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	100	nA	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 1.0	μA	$V_{GS} = \pm 4.5\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	0.88	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.14	0.4	Ω	$V_{GS} = 4.5\text{V}, I_D = 600\text{mA}$
			0.18	0.5		$V_{GS} = 2.5\text{V}, I_D = 500\text{mA}$
			0.28	0.7		$V_{GS} = 1.8\text{V}, I_D = 350\text{mA}$
			—	—		$V_{GS} = 0\text{V}, I_S = 150\text{mA}$
Diode Forward Voltage (Note 7)	V_{SD}	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 150\text{mA}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	42	—	pF	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	13	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	6.5	—	pF	
Total Gate Charge	Q_g	—	0.6	—	nC	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V},$ $I_D = 250\text{mA}$
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.9	—	ns	$V_{DD} = 10\text{V}, V_{GS} = 4.5\text{V},$ $R_L = 47\Omega, R_G = 10\Omega,$ $I_D = 200\text{mA}$
Turn-On Rise Time	t_R	—	3.1	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	386	—	ns	
Turn-Off Fall Time	t_F	—	174	—	ns	
Reverse Recovery Time	t_{RR}	—	88	—	ns	$I_F = 1\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{RR}	—	29	—	nC	

- 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 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

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}	-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 7)						
Gate Threshold Voltage	V _{GS(TH)}	-0.5	-0.8	-1.0	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	0.4	0.7	Ω	V _{GS} = -4.5V, I _D = -430mA
			0.5	0.9		V _{GS} = -2.5V, I _D = -300mA
			0.7	1.3		V _{GS} = -1.8V, I _D = -150mA
Diode Forward Voltage (Note 7)	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	49	—	pF	V _{DS} = -16V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	12	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	3.4	—	pF	
Total Gate Charge	Q _g	—	0.7	—	nC	V _{GS} = -4.5V, V _{DS} = -10V, I _D = -250mA
Gate-Source Charge	Q _{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.1	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	16	—	ns	V _{DD} = -10V, V _{GS} = -4.5V, R _L = 47Ω, R _G = 10Ω, I _D = -200mA
Turn-On Rise Time	t _R	—	15	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	213	—	ns	
Turn-Off Fall Time	t _F	—	89	—	ns	
Reverse Recovery Time	t _{RR}	—	10.5	—	ns	I _F = -1A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	1.8	—	nC	

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

Typical Characteristics - N-CHANNEL

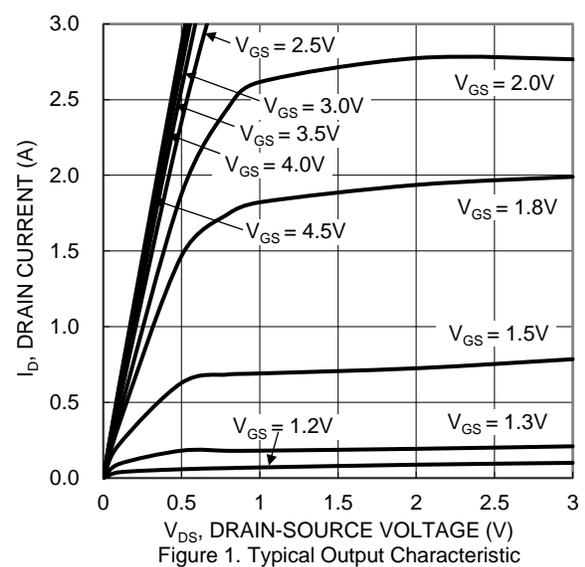


Figure 1. Typical Output Characteristic

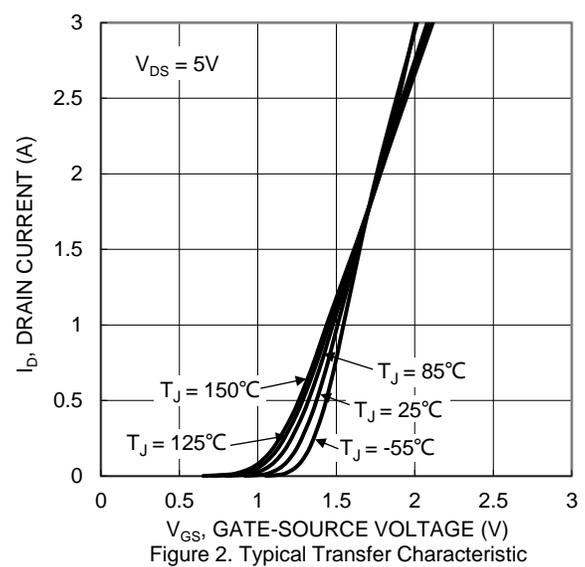


Figure 2. Typical Transfer Characteristic

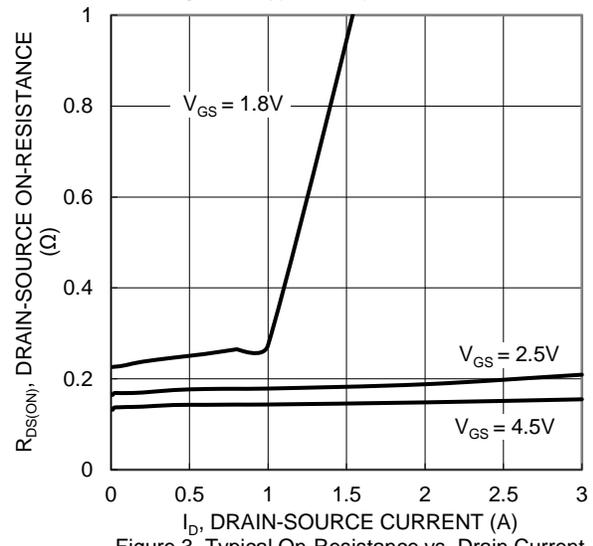


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

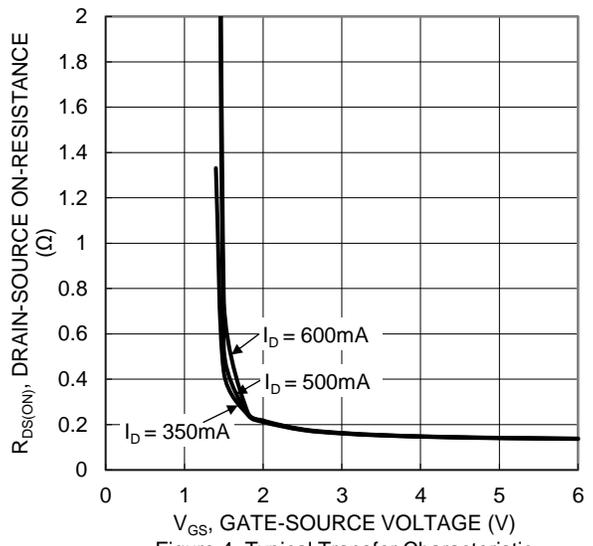


Figure 4. Typical Transfer Characteristic

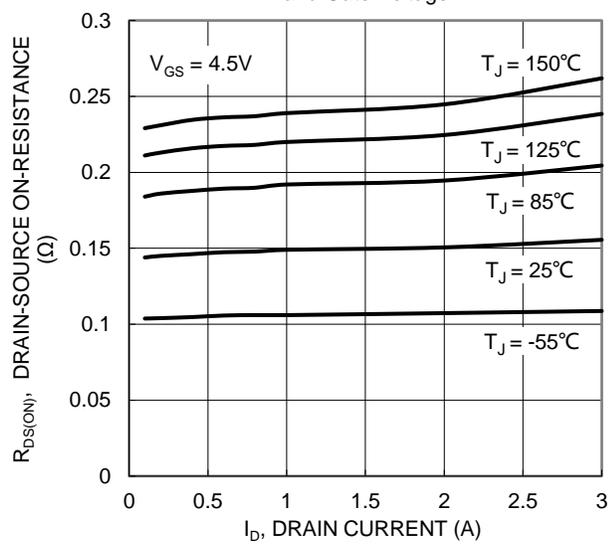


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

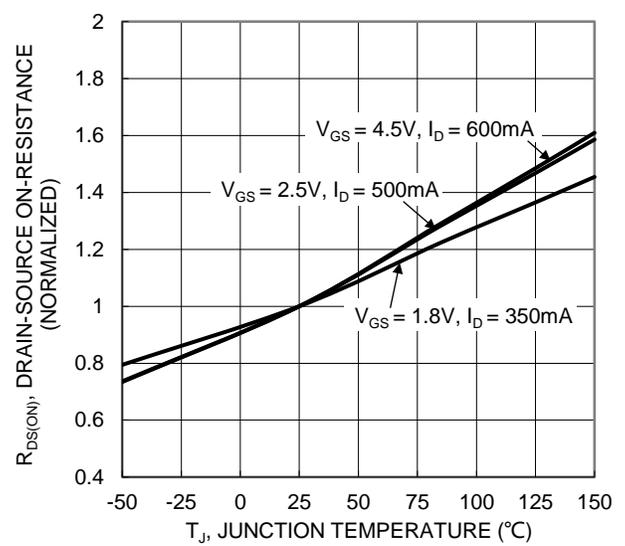


Figure 6. On-Resistance Variation with Junction Temperature

Typical Characteristics - N-CHANNEL (continued)

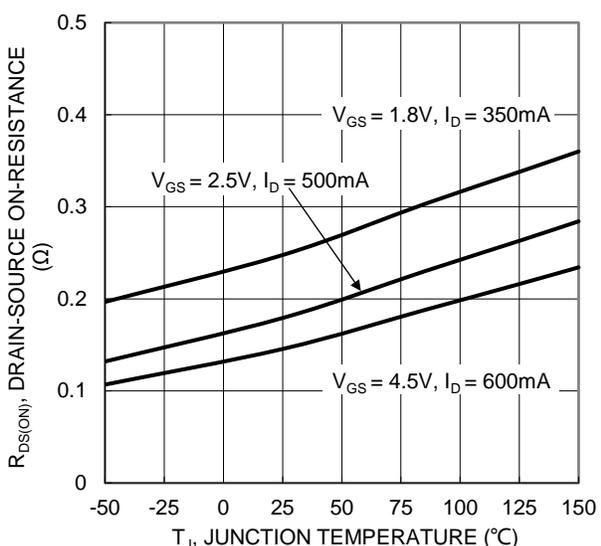


Figure 7. On-Resistance Variation with Junction Temperature

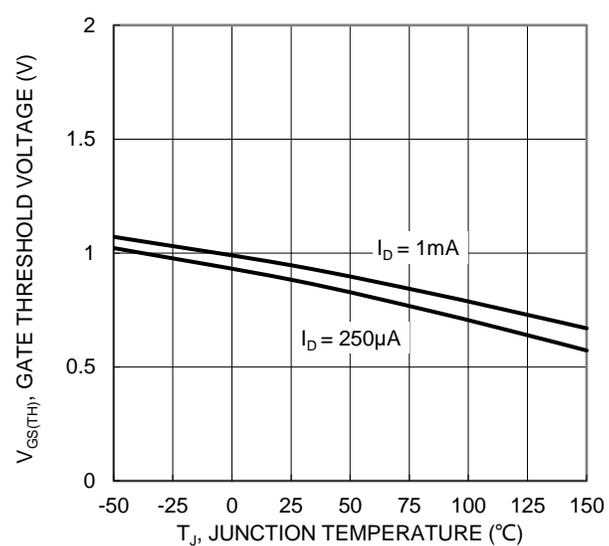


Figure 8. Gate Threshold Variation vs. Junction Temperature

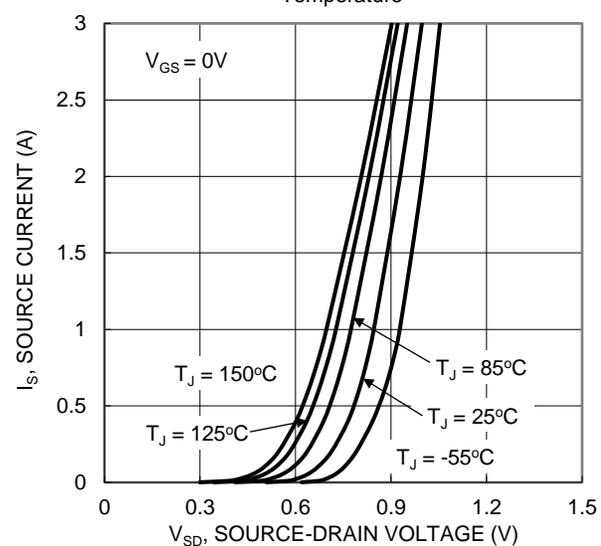


Figure 9. Diode Forward Voltage vs. Current

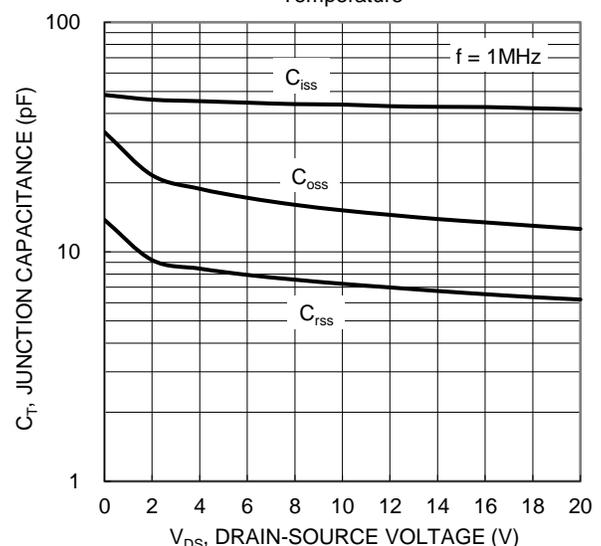


Figure 10. Typical Junction Capacitance

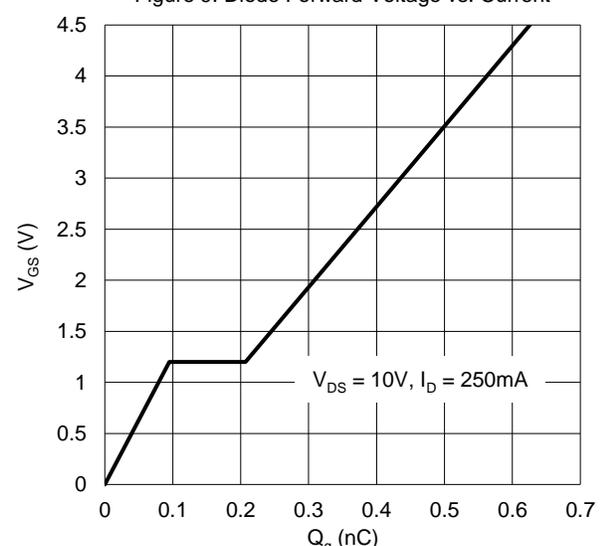


Figure 11. Gate Charge

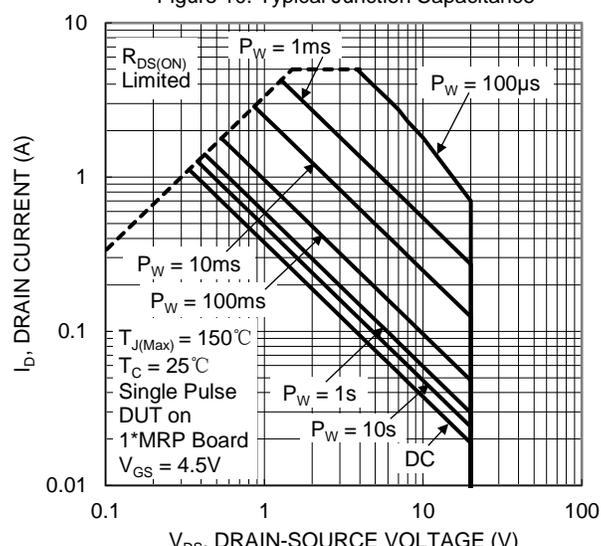


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

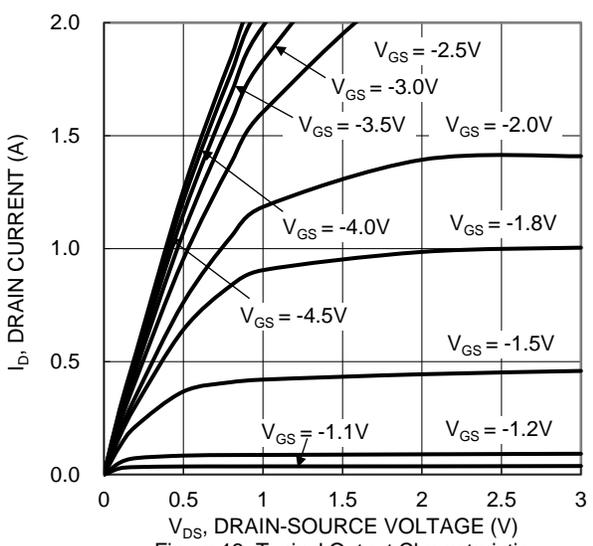


Figure 13. Typical Output Characteristic

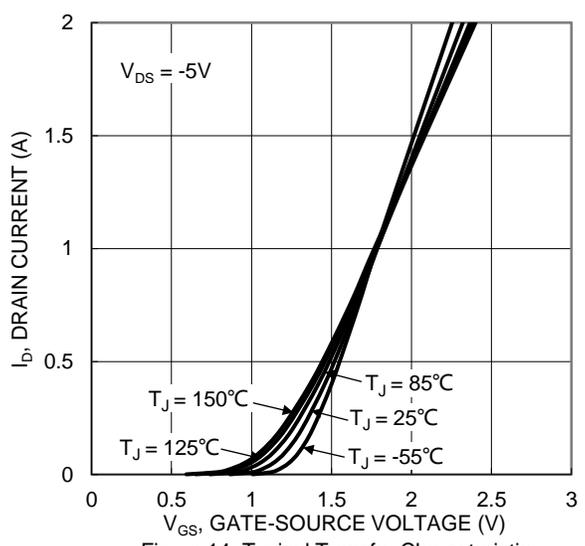


Figure 14. Typical Transfer Characteristic

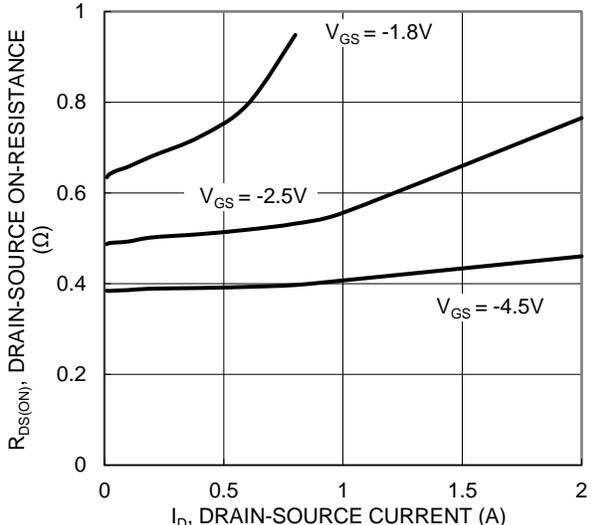


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

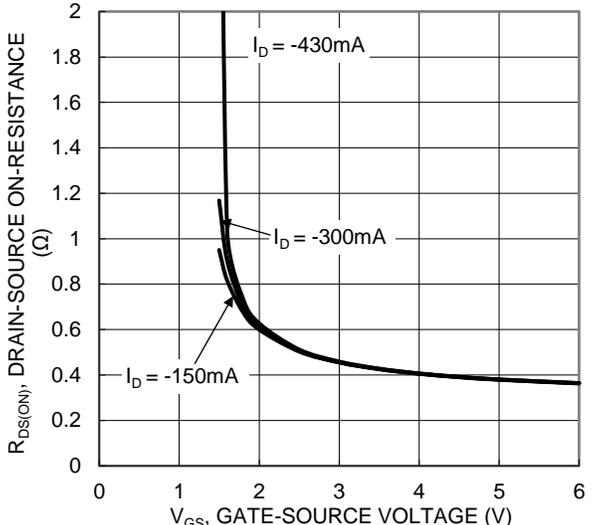


Figure 16. Typical Transfer Characteristic

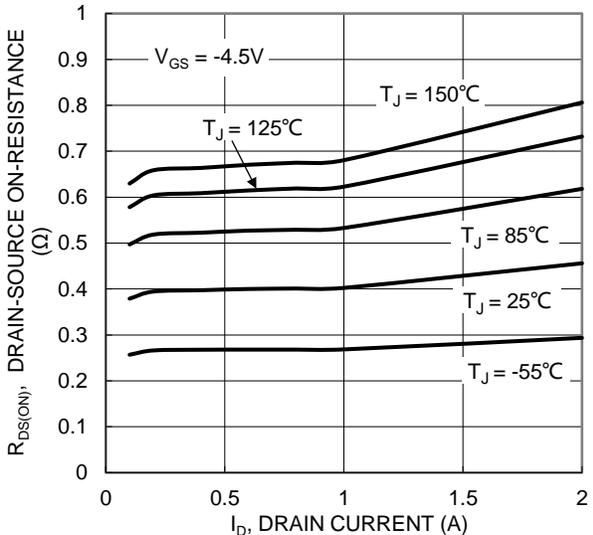


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

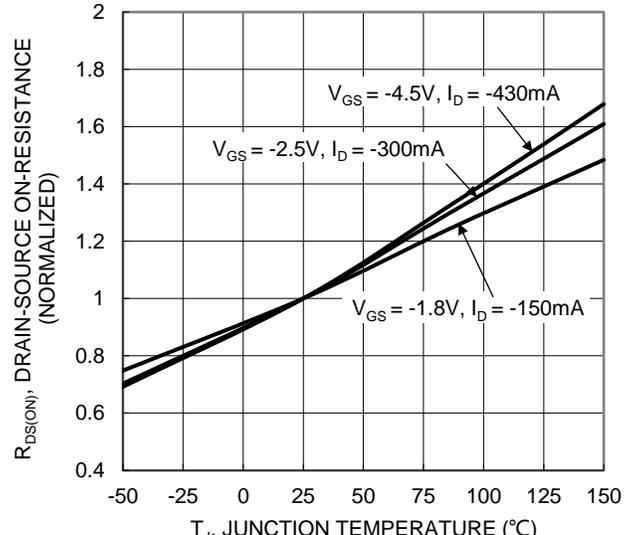


Figure 18. On-Resistance Variation with Junction Temperature

Typical Characteristics - P-CHANNEL (continued)

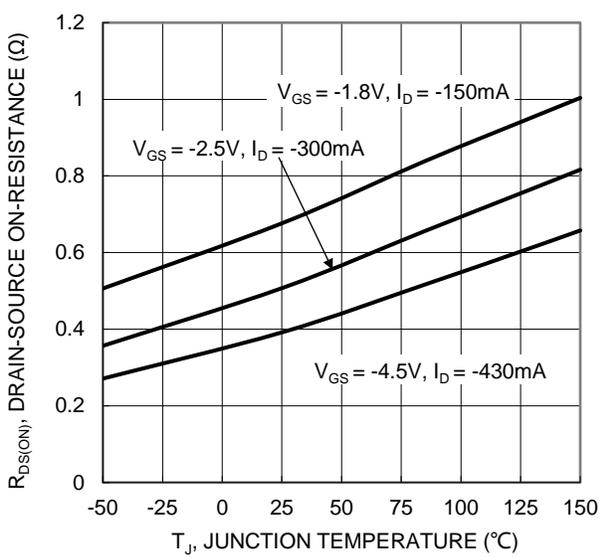


Figure 19. On-Resistance Variation with Junction Temperature

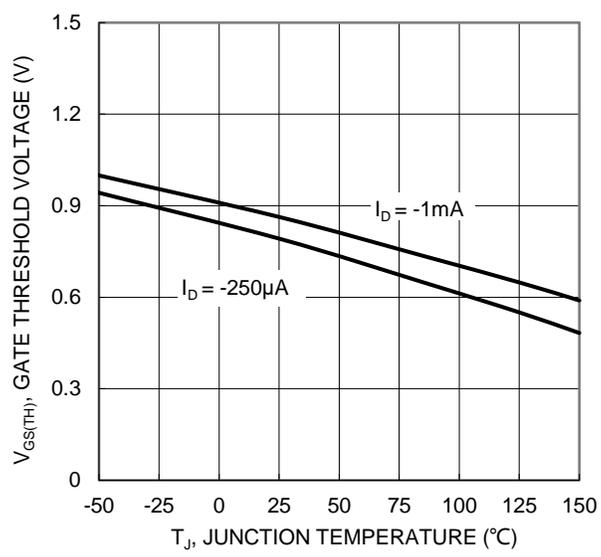


Figure 20. Gate Threshold Variation vs. Junction Temperature

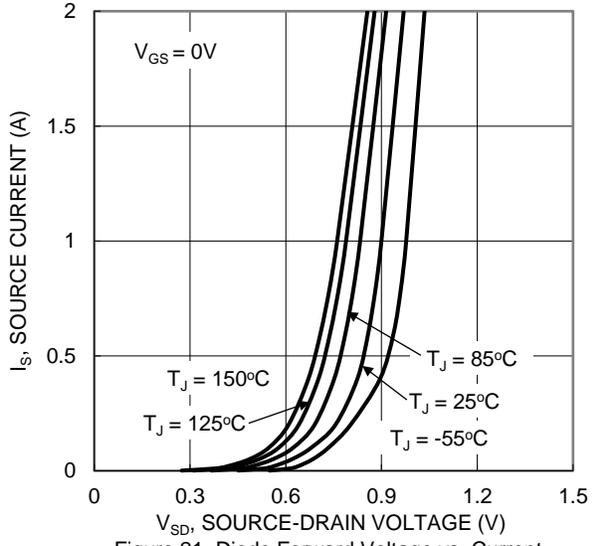


Figure 21. Diode Forward Voltage vs. Current

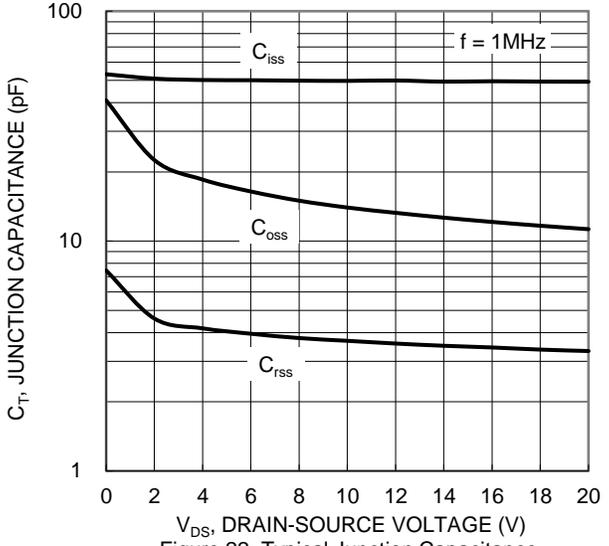


Figure 22. Typical Junction Capacitance

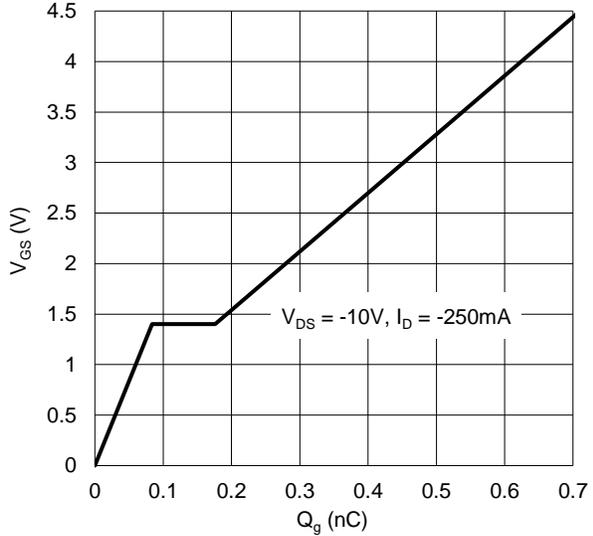


Figure 23. Gate Charge

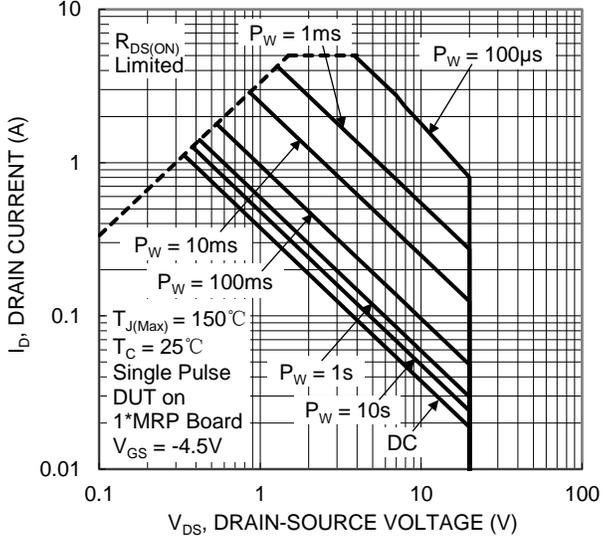


Figure 24. SOA, Safe Operation Area

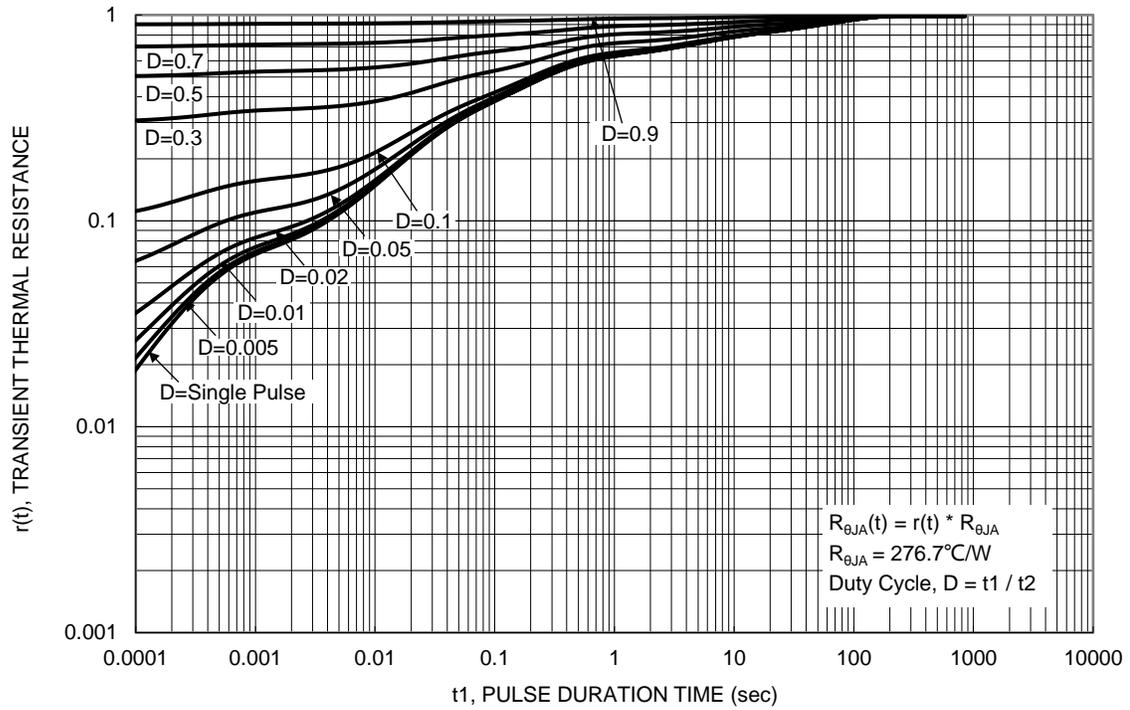
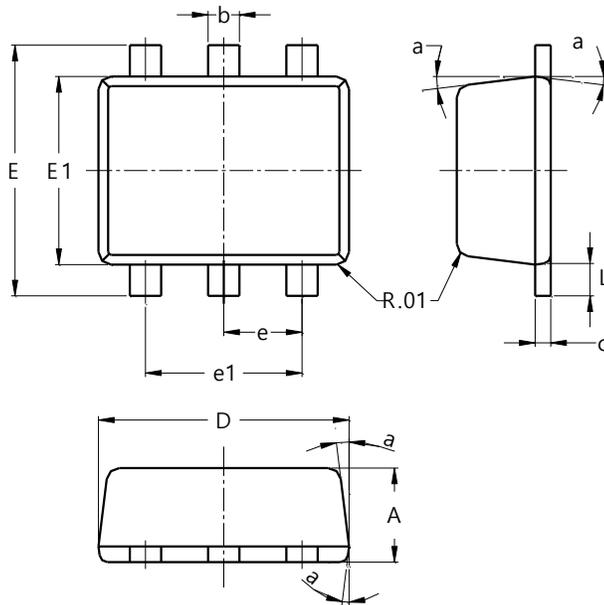


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

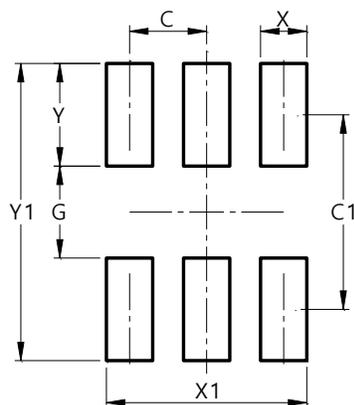
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Dim	Min	Max	Typ
A	0.55	0.60	--
b	0.15	0.30	0.20
c	0.10	0.18	0.11
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	--	--	0.50
e1	0.90	1.10	1.00
L	0.10	0.30	0.20
a	8°	9°	7°
All Dimensions in mm			

Suggested Pad Layout

SOT563



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