优尚

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}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
Q1	60V	1.7Ω @ V_{GS} = 10V	571mA
		3Ω @ V_{GS} = 4.5V	430mA
Q2	-50V	6Ω @ V_{GS} = -10V	-304mA
		8Ω @ V_{GS} = -5V	-263mA

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface-Mount Package
- ESD Protected Gate

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:

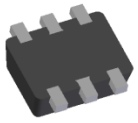
- Power-management functions
- DC-DC converters
- Batteries

Mechanical Data

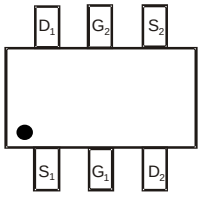
- Package: SOT563
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.003 grams (Approximate)

SOT563

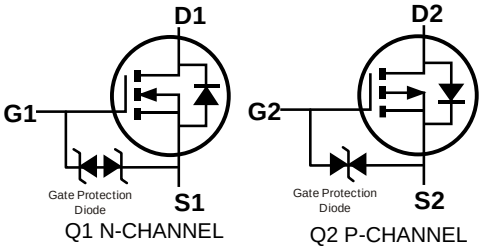
Top View



Bottom View



Top View



Equivalent Circuit

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Q1_Value	Q2_Value	Unit
Drain-Source Voltage			V_{DSS}	60	-50	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current (Note 5) N-Channel: V_{GS} = 10V P-Channel: V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	571 457	-304 -243	mA
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I_{DM}	1,200	-800	mA
Maximum Body Diode Continuous Current (Note 5)			I_S	500	-300	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)		P_D	0.51	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	250	°C/W
Total Power Dissipation (Note 5)		P_D	0.84	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	150	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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 – Q1 N-CHANNEL (@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	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	$R_{DS(ON)}$	—	1.3	1.7	Ω	V_{GS} = 10V, I_D = 500mA
		—	1.4	3		V_{GS} = 4.5V, I_D = 200mA
Diode Forward Voltage	V_{SD}	—	—	1.4	V	V_{GS} = 0V, I_S = 115mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	30	—	pF	V_{DS} = 25V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	4.2	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.9	—	pF	
Total Gate Charge	Q_g	—	0.4	—	nC	V_{GS} = 4.5V, V_{DS} = 10V I_D = 250mA
Gate-Source Charge	Q_{gs}	—	0.15	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.09	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.3	—	ns	V_{DD} = 30V, V_{GS} = 10V R_g = 25Ω, I_D = 200mA
Turn-On Rise Time	t_R	—	2.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.1	—	ns	
Turn-Off Fall Time	t_F	—	6.5	—	ns	

Electrical Characteristics – Q2 P-CHANNEL (@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}	-50	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -50V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1	—	-2.5	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.7	6	Ω	V_{GS} = -10V, I_D = -500mA
		—	3.7	8		V_{GS} = -5V, I_D = -200mA
Diode Forward Voltage	V_{SD}	—	—	-1.4	V	V_{GS} = 0V, I_S = -115mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	26	—	pF	V_{DS} = -25V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	4.2	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.4	—	pF	
Total Gate Charge	Q_g	—	0.3	—	nC	V_{GS} = -4.5V, V_{DS} = -10V I_D = -500mA
Gate-Source Charge	Q_{gs}	—	0.14	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.12	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.1	—	ns	V_{DD} = -30V, V_{GS} = -10V R_g = 50Ω, I_D = -270mA
Turn-On Rise Time	t_R	—	2.8	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	20.2	—	ns	
Turn-Off Fall Time	t_F	—	9.15	—	ns	

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

Typical Characteristics – N-CHANNEL

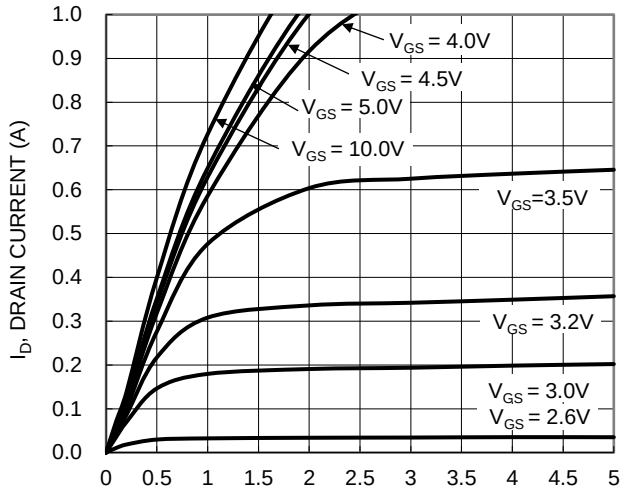


Figure 1. Typical Output Characteristic

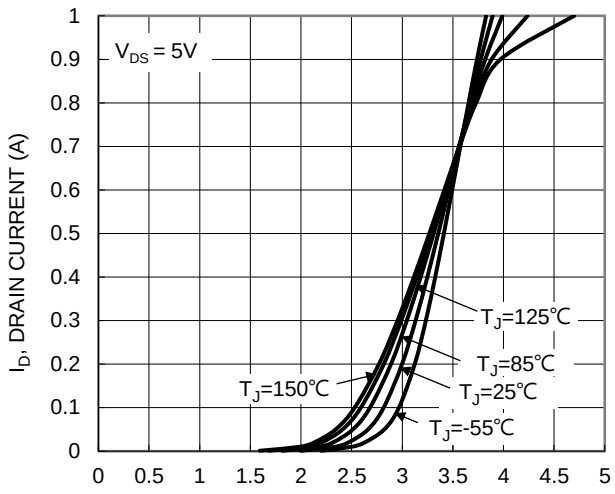


Figure 2. Typical Transfer Characteristic

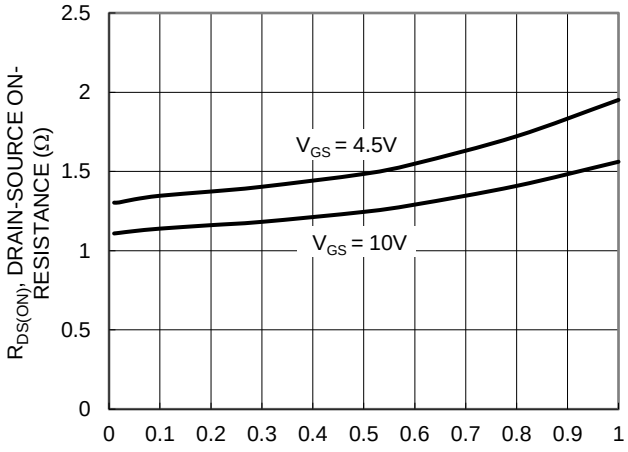


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

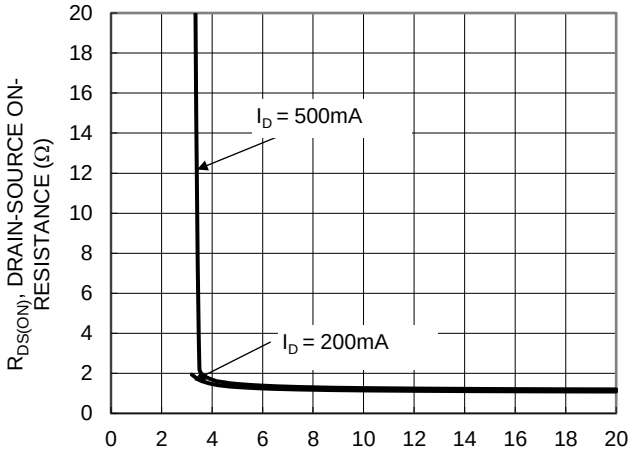


Figure 4. Typical Transfer Characteristic

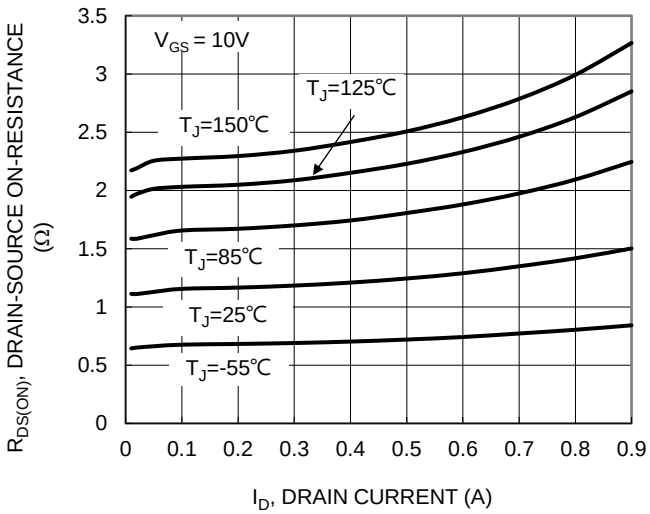


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

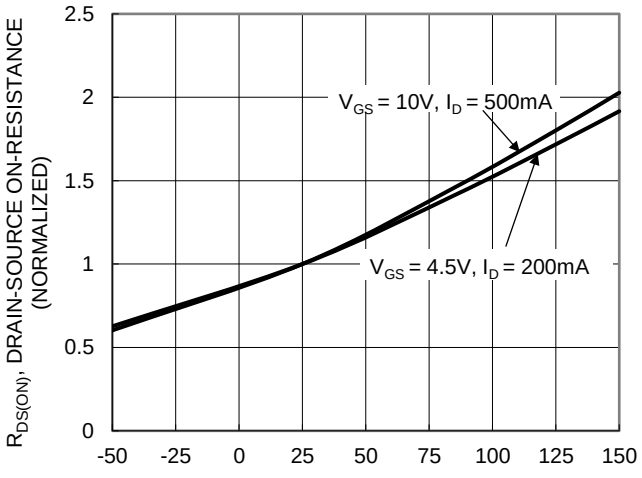


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics – N-CHANNEL (continued)

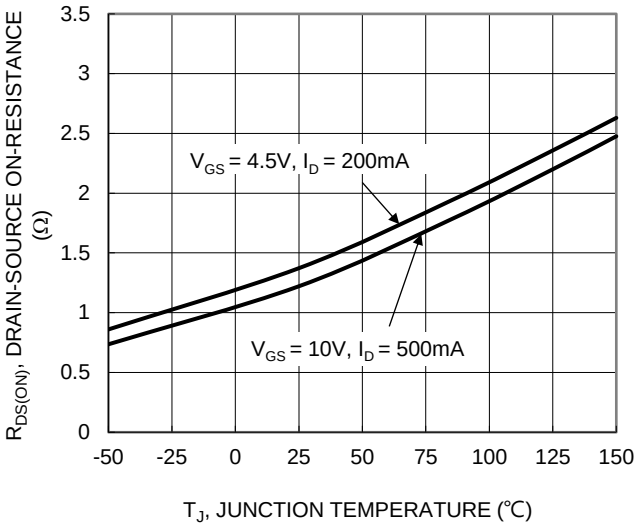


Figure 7. On-Resistance Variation with Temperature

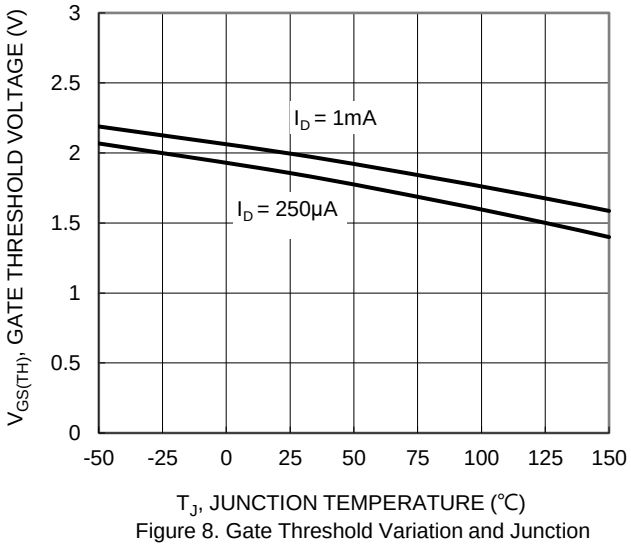


Figure 8. Gate Threshold Variation and Junction Temperature

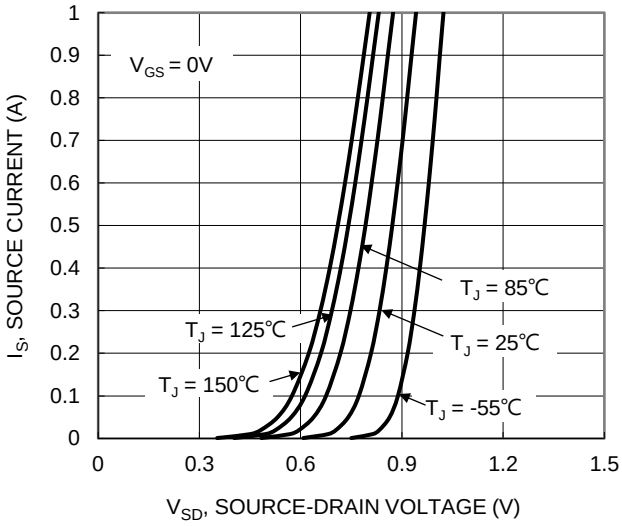


Figure 9. Diode Forward Voltage vs. Current

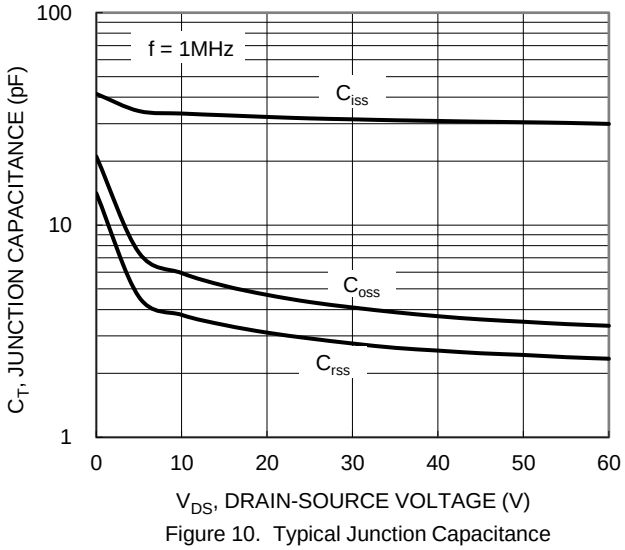


Figure 10. Typical Junction Capacitance

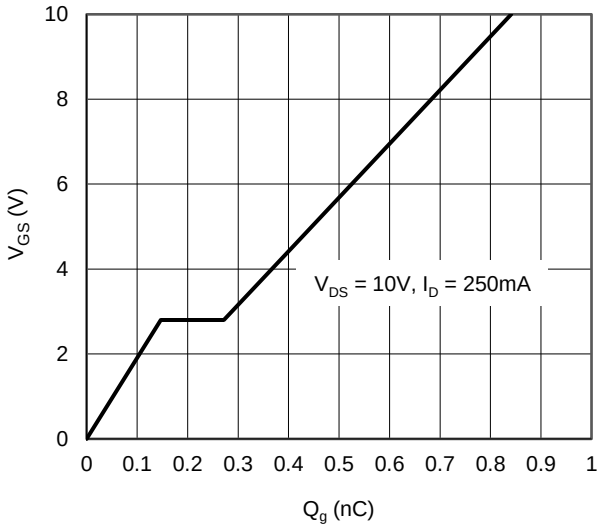


Figure 11. Gate Charge

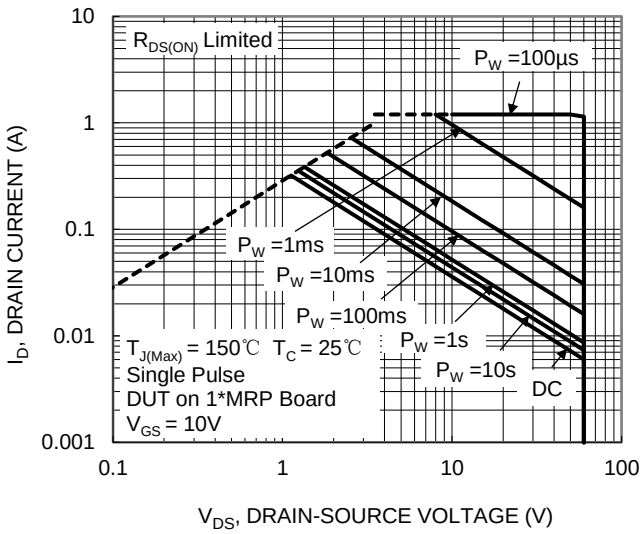


Figure 12. SOA, Safe Operation Area

Typical Characteristics – P-CHANNEL

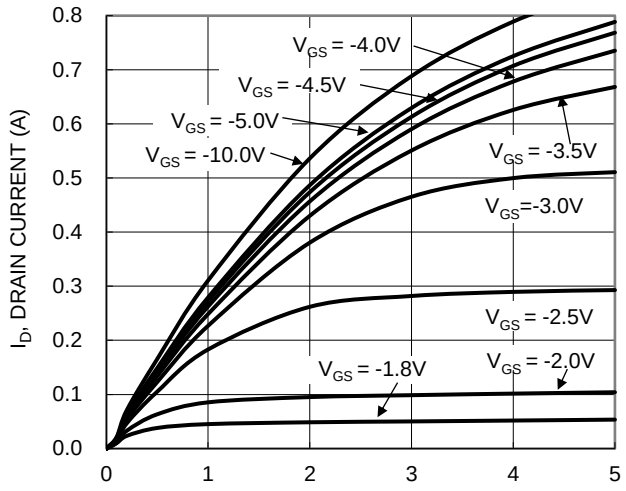


Figure 13. Typical Output Characteristic

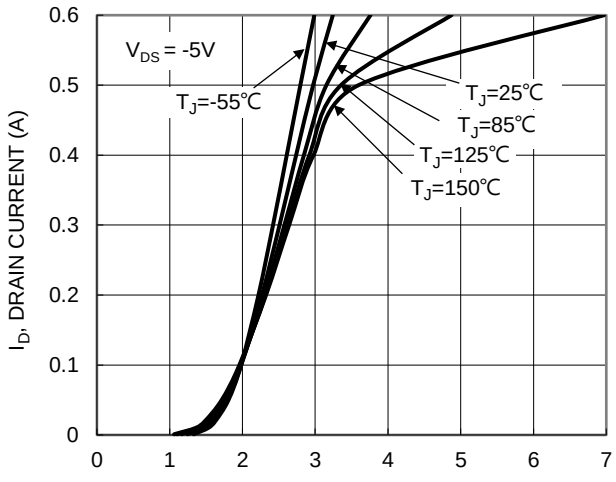


Figure 14. Typical Transfer Characteristic

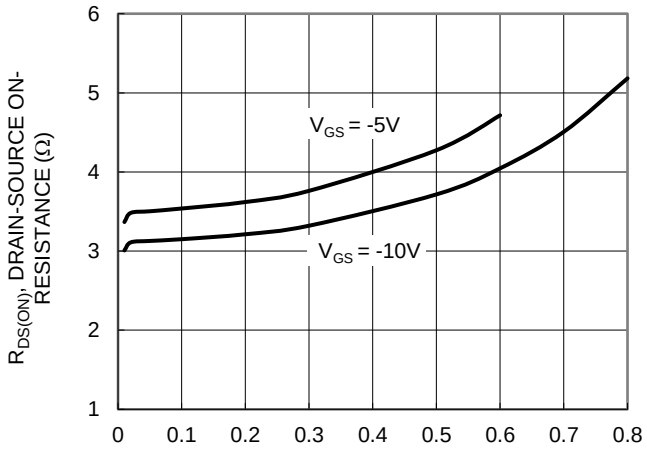


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

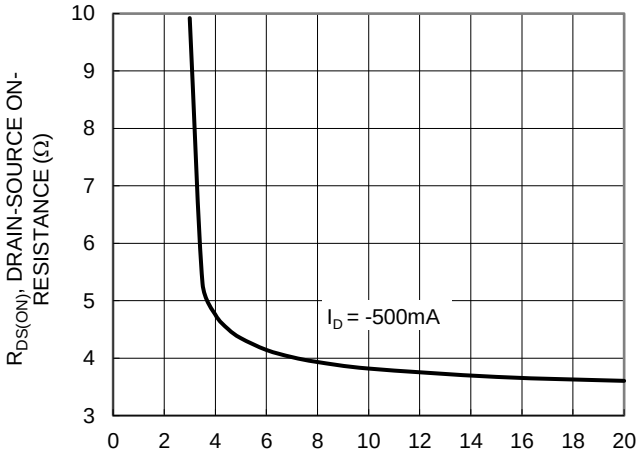


Figure 16. Typical Transfer Characteristic

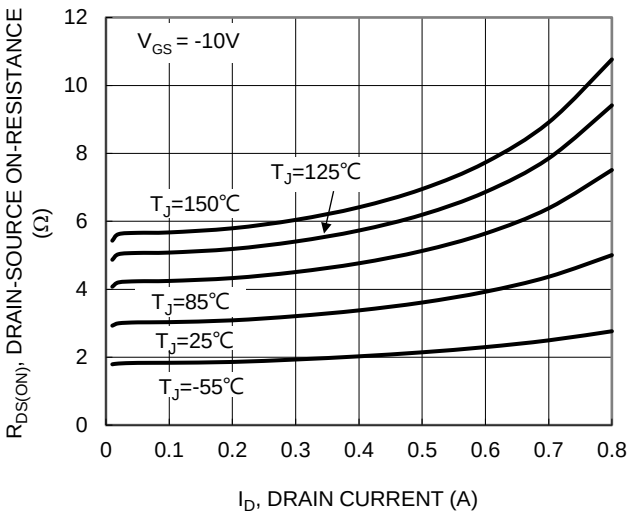


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

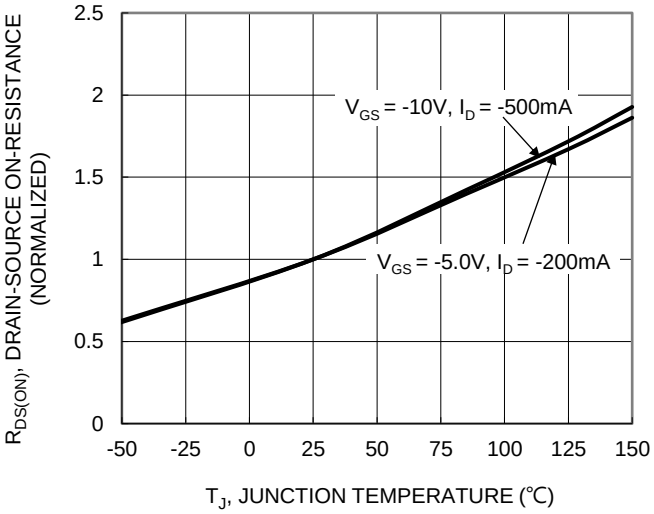


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics – P-CHANNEL (continued)

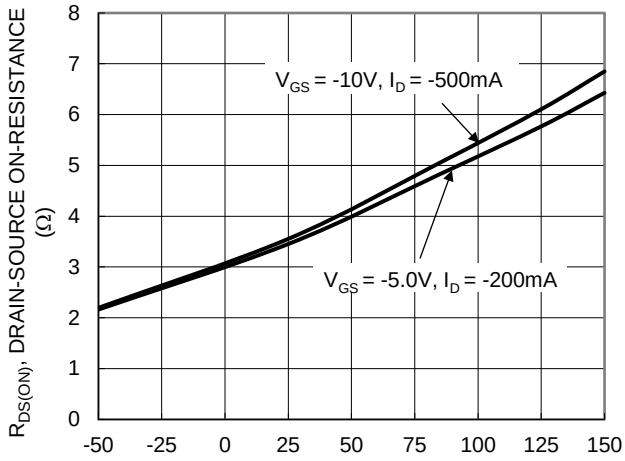


Figure 19. On-Resistance Variation with Temperature

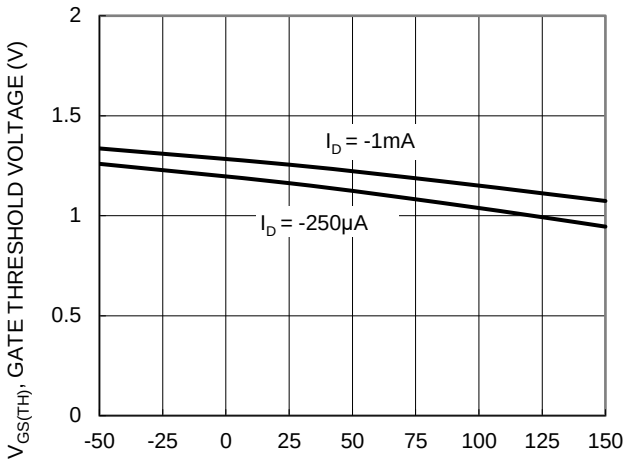


Figure 20. Gate Threshold Variation vs. Junction Temperature

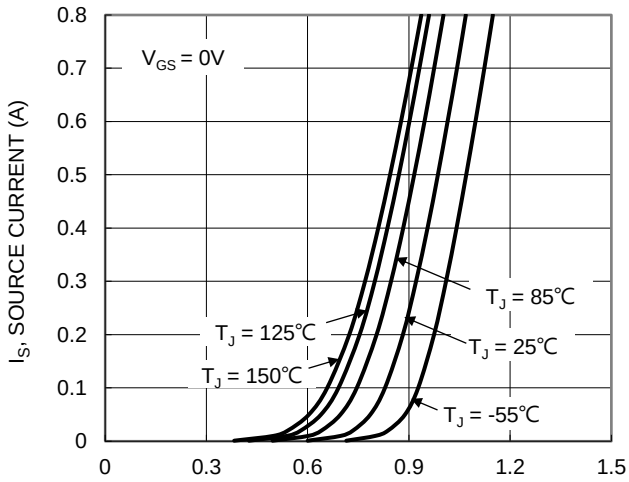


Figure 21. Diode Forward Voltage vs. Current

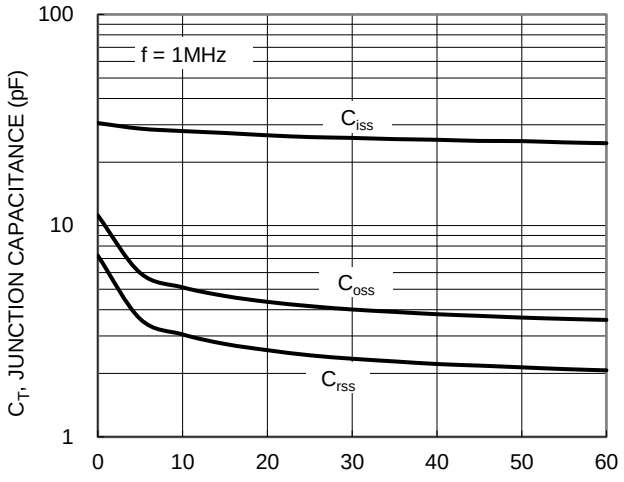


Figure 22. Typical Junction Capacitance

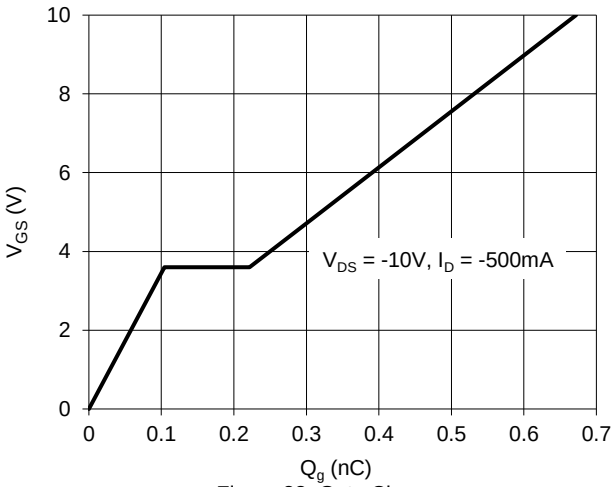


Figure 23. Gate Charge

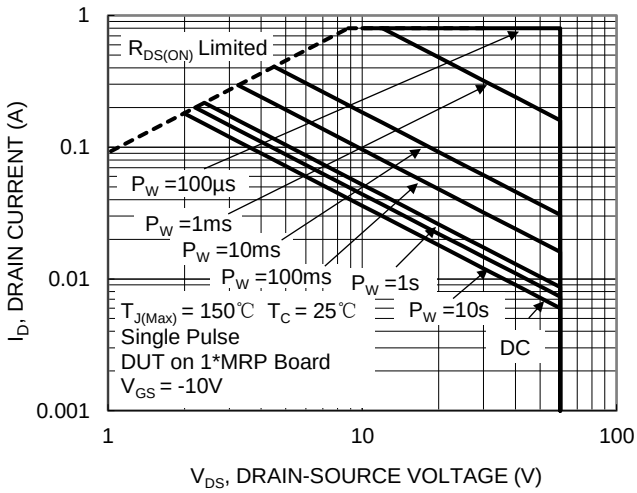


Figure 24. SOA, Safe Operation Area

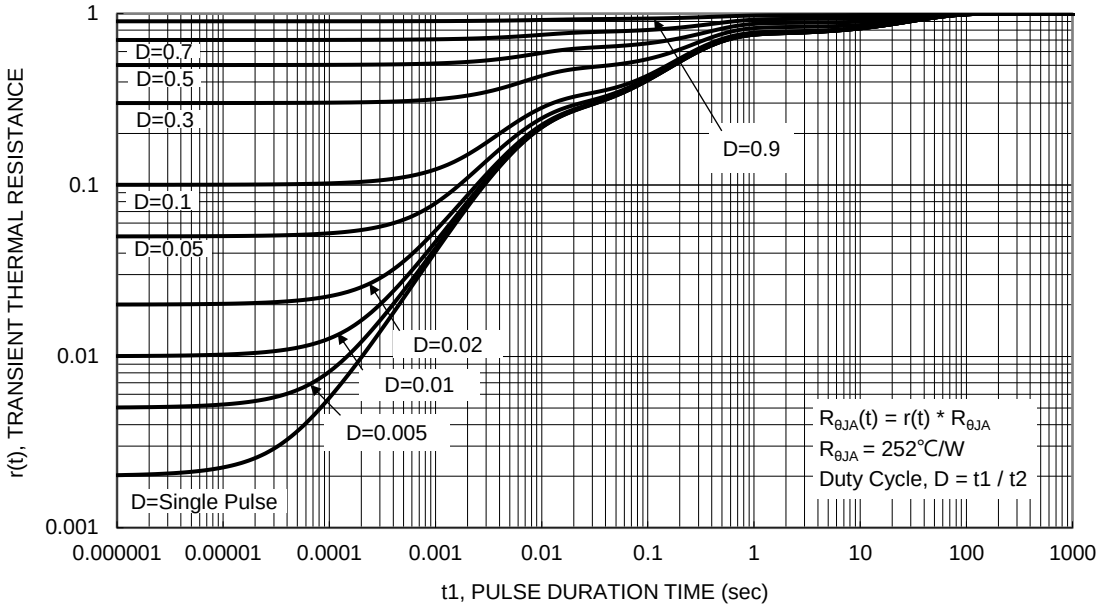
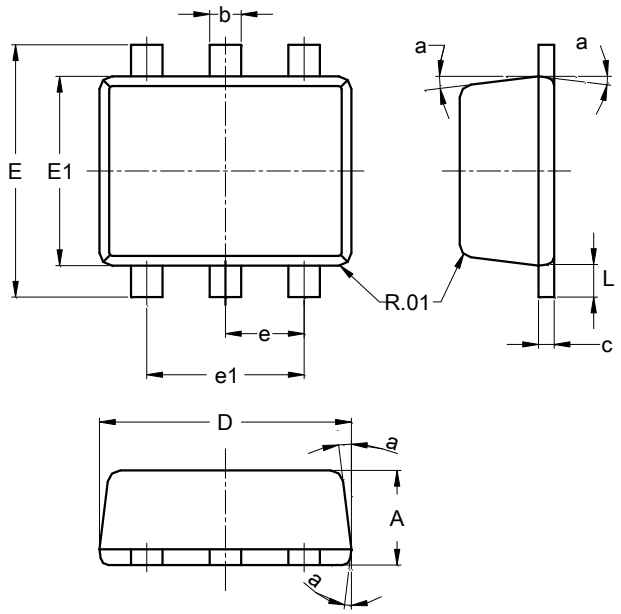


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

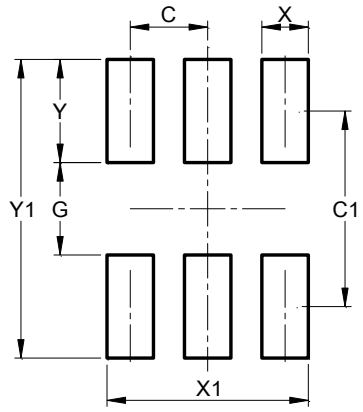
SOT563



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

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