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	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
Q1	40V	15mΩ @ V_{GS} = 10V	12.2A
		20mΩ @ V_{GS} = 4.5V	10.6A
Q2	-40V	29mΩ @ V_{GS} = -10V	-8.8A
		45mΩ @ V_{GS} = -4.5V	-7.1A

Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed

Description

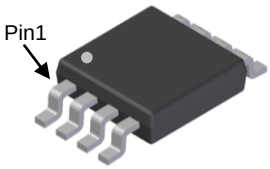
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, which makes it ideal for high-efficiency power management applications.

Applications

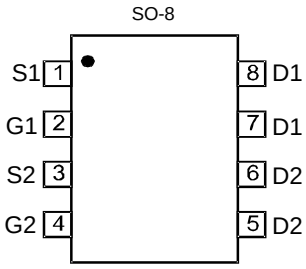
- DC-DC Converters
- Power Management Functions
- Backlighting

Mechanical Data

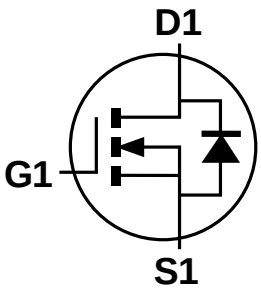
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.074 grams (Approximate)



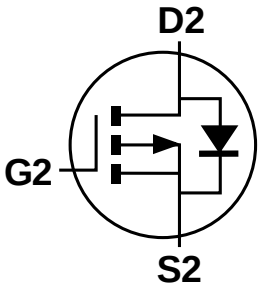
Top View



Top View
Pin Configuration



Q N-Channel MOSFET



Q2 P-Channel MOSFET

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

Characteristic			Symbol	Value_Q1	Value_Q2	Units
Drain-Source Voltage			V_{DSS}	40	-40	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	8.6 6.8	-6.2 -4.9	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	12.2 9.8	-8.8 -7.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	80	-50	A
Maximum Body Diode Forward Current (Note 6)			I_S	2.5	-2.2	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	80	-50	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	27	-25	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	37	32	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.2	W
	T_A = +70°C		0.9	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\Theta JA}$	106	°C/W
	t<10s		45	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\Theta JA}$	76	°C/W
	t<10s		37	
Thermal Resistance, Junction to Case (Note 6)		$R_{\Theta JC}$	12	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	15	mΩ	V_{GS} = 10V, I_D = 3A
		—	—	20		V_{GS} = 4.5V, I_D = 3A
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1810	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	135	—		
Reverse Transfer Capacitance	C_{rss}	—	112	—		
Gate Resistance	R_G	—	1.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	19	—	nC	V_{DS} = 20V, I_D = 3A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	40	—		
Gate-Source Charge	Q_{gs}	—	5.5	—		
Gate-Drain Charge	Q_{gd}	—	6.3	—		
Turn-On Delay Time	$t_{D(on)}$	—	5.1	—	nS	V_{DD} = 20V, I_D = 3A V_{GS} = 10V, R_G = 3Ω,
Turn-On Rise Time	t_r	—	5.7	—		
Turn-Off Delay Time	$t_{D(off)}$	—	23	—		
Turn-Off Fall Time	t_f	—	6.3	—		
Body Diode Reverse Recovery Time	t_{rr}	—	12.2	—	nS	I_S = 3A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	5.4	—	nC	I_S = 3A, dI/dt = 100A/µs

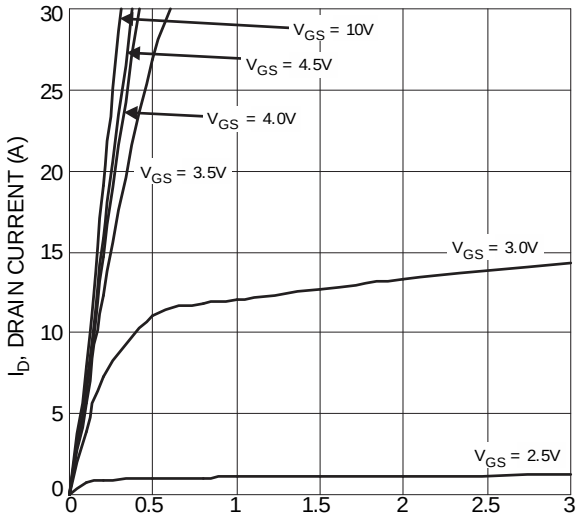


Figure 1 Typical Output Characteristics

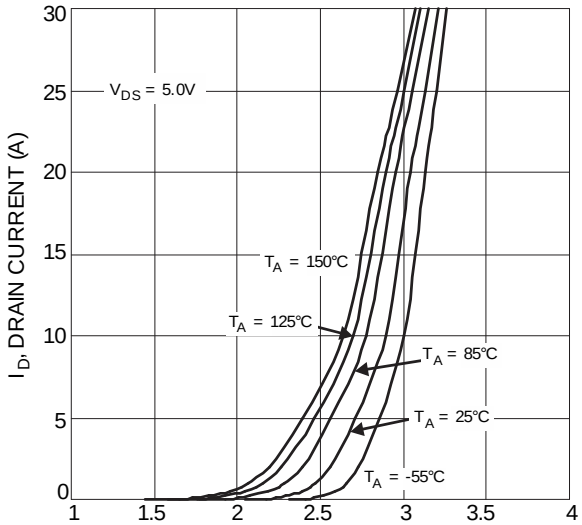


Figure 2 Typical Transfer Characteristics

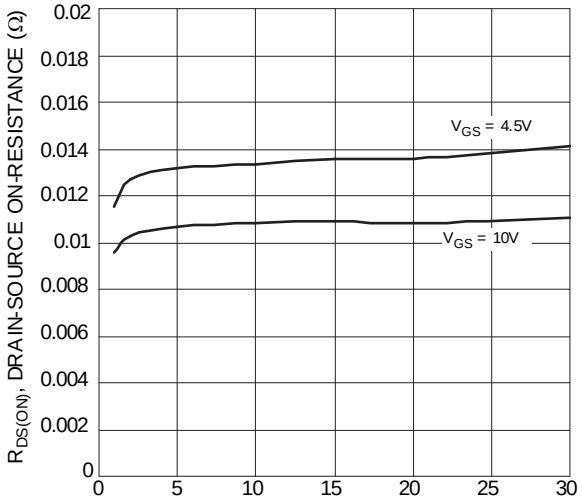


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

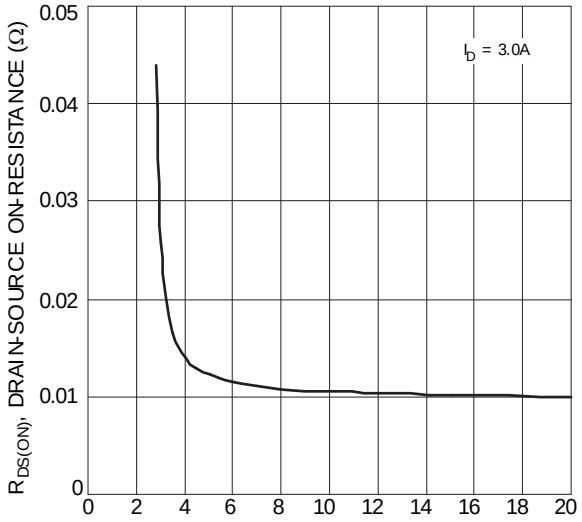


Figure 4 Typical Transfer Characteristic

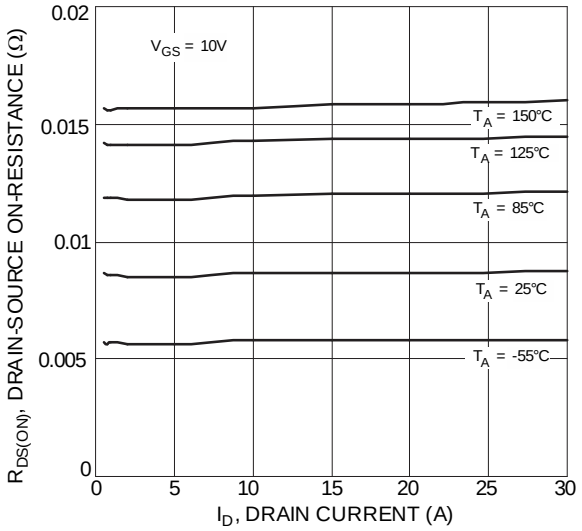


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

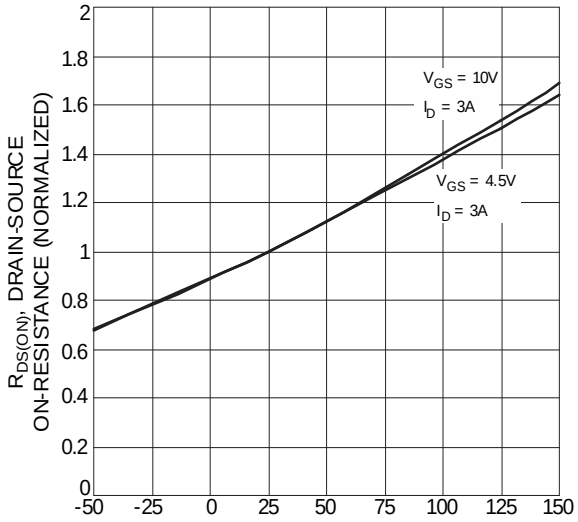


Figure 6 On-Resistance Variation with Temperature

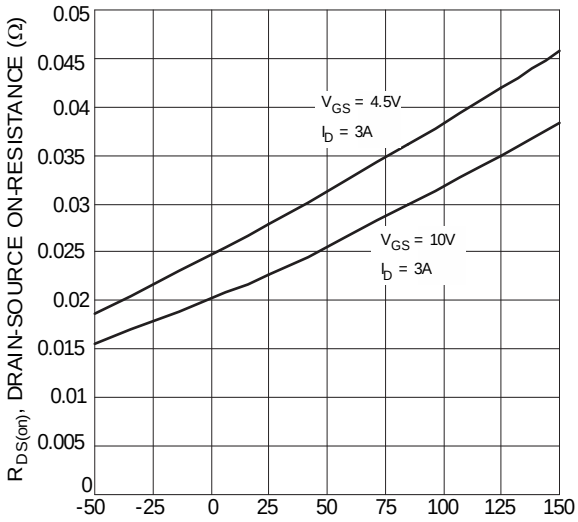


Figure 7 On-Resistance Variation with Temperature

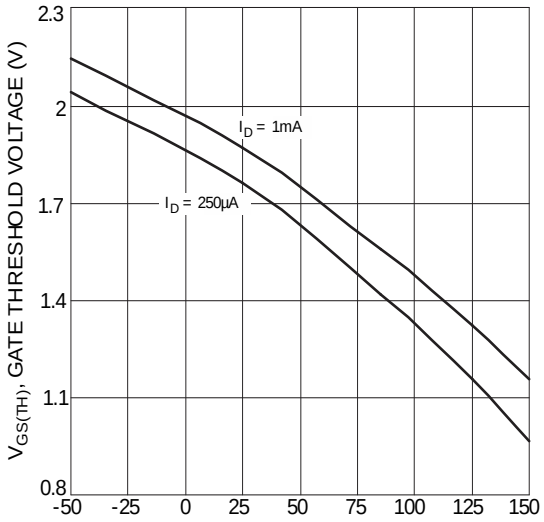


Figure 8 Gate Threshold Variation vs. Ambient Temperature

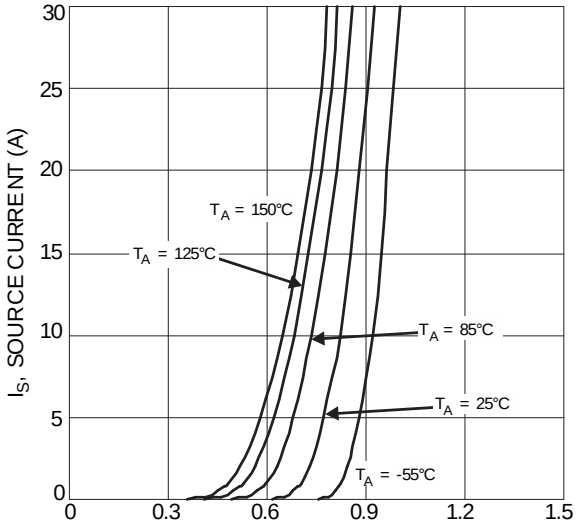


Figure 9 Diode Forward Voltage vs. Current

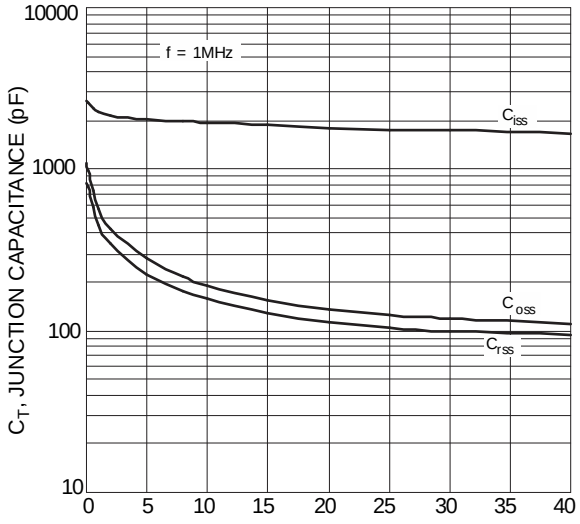


Figure 10 Typical Junction Capacitance

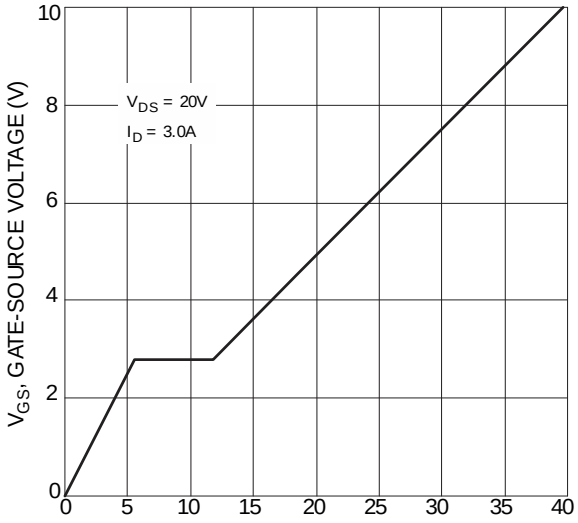


Figure 11 Gate-Charge Characteristics

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	—	-3	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	29	mΩ	V_{GS} = -10V, I_D = -3A
		—	—	45		V_{GS} = -4.5V, I_D = -3A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1626	—	pF	V_{DS} = -20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	135	—		
Reverse Transfer Capacitance	C_{rss}	—	107	—		
Gate Resistance	R_G	—	11	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	17	—	nC	V_{DS} = -20V, I_D = -3A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	34	—		
Gate-Source Charge	Q_{gs}	—	3.7	—		
Gate-Drain Charge	Q_{gd}	—	6.0	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.9	—	nS	V_{DD} = -20V, R_L = 1.6Ω, V_{GS} = -10V, R_G = 3Ω, I_D = -3A
Turn-On Rise Time	t_r	—	2.8	—		
Turn-Off Delay Time	$t_{D(off)}$	—	83	—		
Turn-Off Fall Time	t_f	—	30	—		
Body Diode Reverse Recovery Time	t_{rr}	—	17.3	—	nS	I_S = -3A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	—	7.2	—	nC	I_S = -3A, dI/dt = 100A/μs

Notes:
5. Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

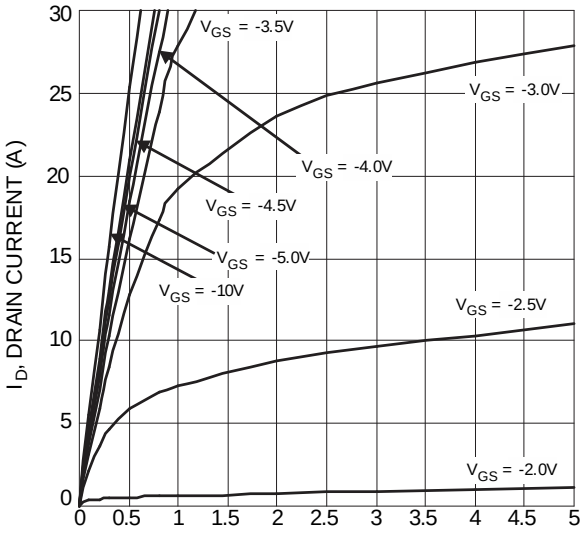


Figure 12 Typical Output Characteristics

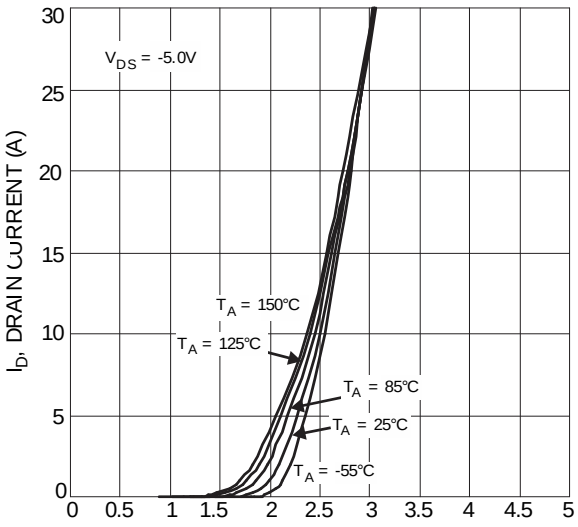


Figure 13 Typical Transfer Characteristics

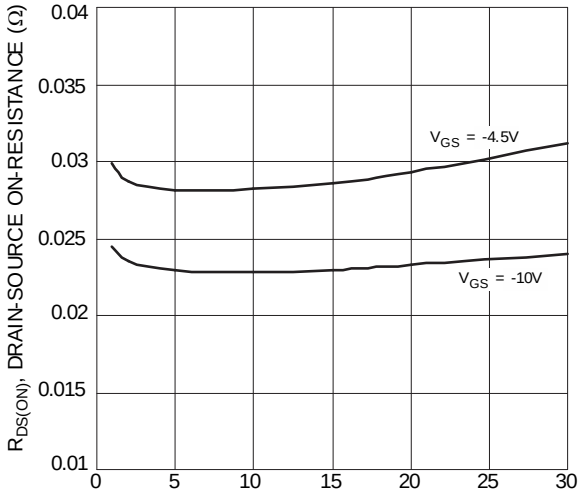


Figure 14 Typical On-Resistance vs.
Drain Current and Gate Voltage

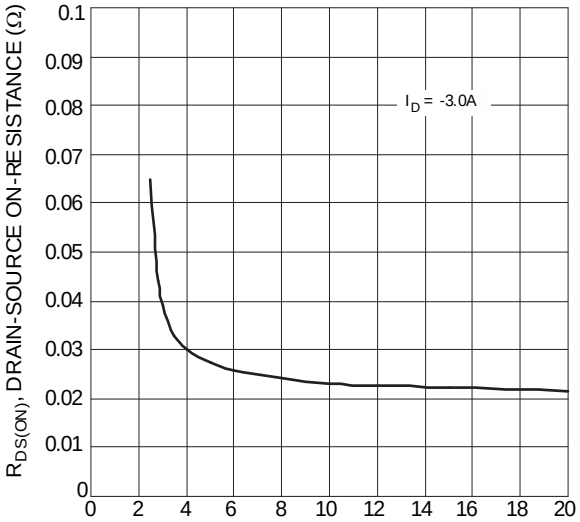


Figure 15 Typical Transfer Characteristic

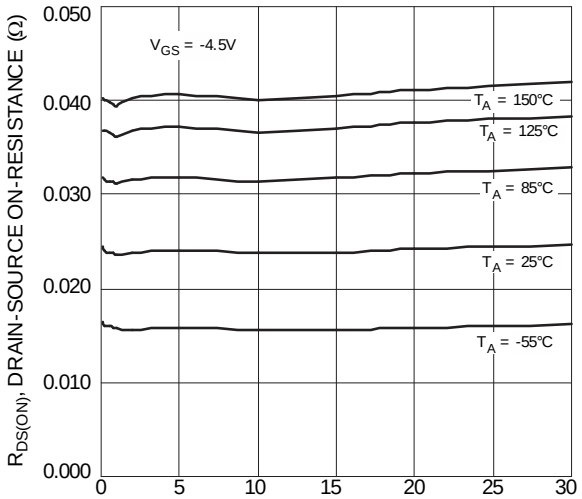


Figure 16 Typical On-Resistance vs.
Drain Current and Temperature

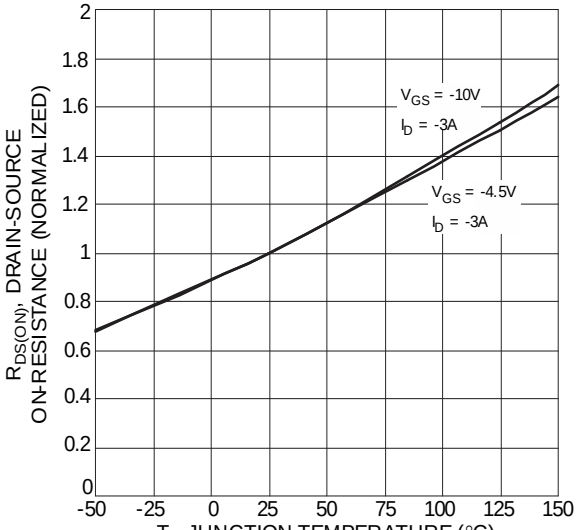


Figure 17 On-Resistance Variation with Temperature

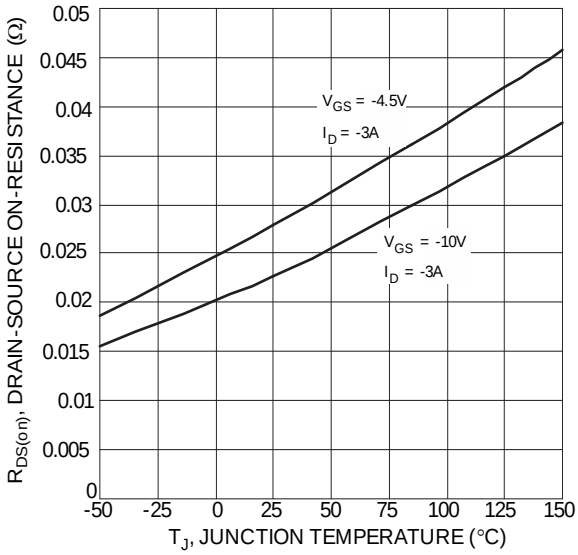


Figure 18 On-Resistance Variation with Temperature

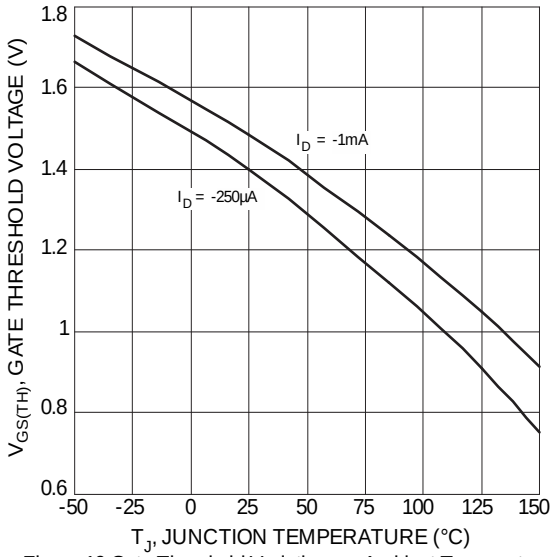


Figure 19 Gate Threshold Variation vs. Ambient Temperature

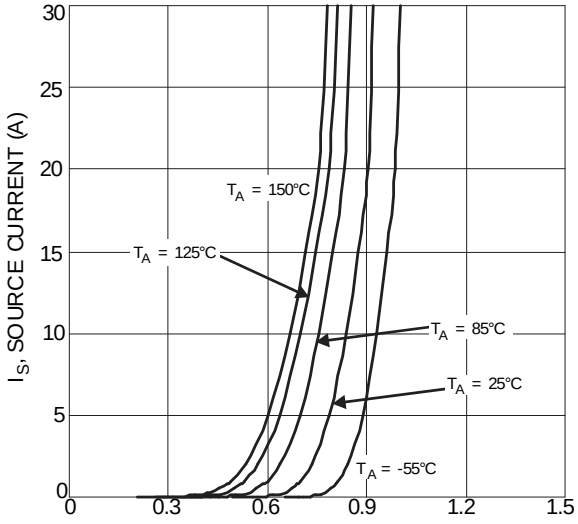


Figure 20 Diode Forward Voltage vs. Current

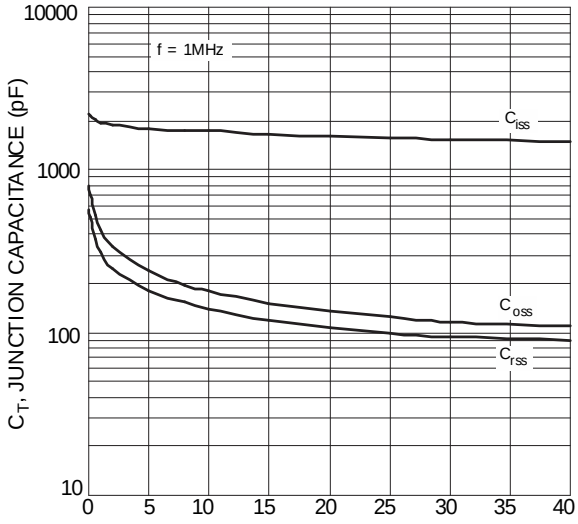


Figure 21 Typical Junction Capacitance

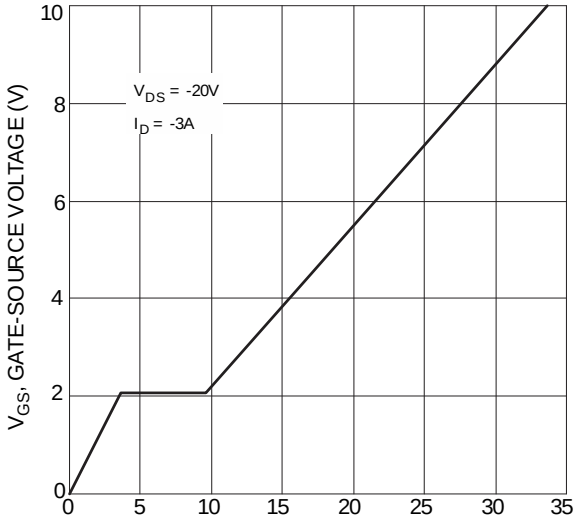
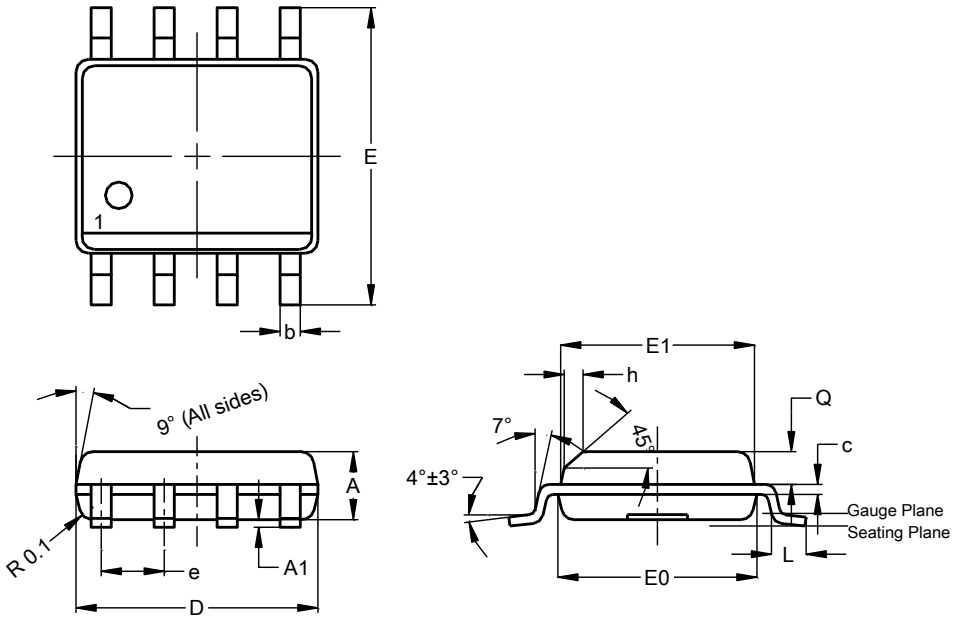


Figure 22 Gate-Charge Characteristics

Package Outline Dimensions

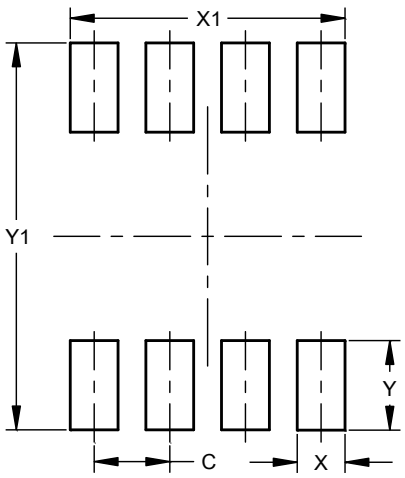
SO-8



SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	—	—	1.27
h	—	—	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50