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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Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
Q1	30V	25mΩ @ V_{GS} = 10V	6.5A
		29mΩ @ V_{GS} = 4.5V	6.1A
Q2	-30V	28mΩ @ V_{GS} = -10V	-6.2A
		38mΩ @ V_{GS} = -4.5V	-5.3A

Features and Benefits

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

Description

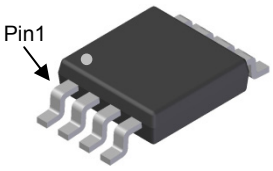
This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

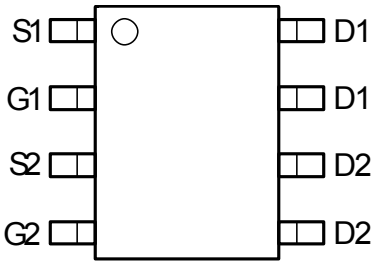
- DC-DC Converters
- Power Management Functions
- Backlighting

Mechanical Data

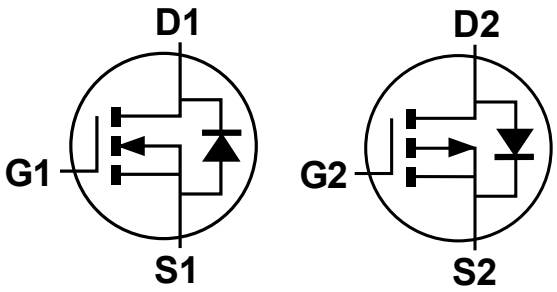
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208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



Top View



Top View
Pin Configuration



Equivalent Circuit

Maximum Ratings – Q1 and Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Q1	Q2	Units
Drain-Source Voltage			V_{DSS}	30	-30	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	6.5 5.2	-6.2 -5.0	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	8.2 6.7	-8.0 -6.5	A
Maximum Body Diode Forward Current (Note 6)			I_S	2.2	-2.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)			I_{DM}	40	-40	A
Avalanche Current (Notes 7) L = 0.1mH			I_{AS}	14.5	22	A
Avalanche Energy (Notes 7) L = 0.1mH			E_{AS}	10.5	25	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		0.8	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	102	°C/W
	t<10s		62	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.6	W
	T_A = +70°C		1.0	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	78	°C/W
	t<10s		47	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	14.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics – 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}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 24V, 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	$R_{DS(ON)}$	—	19	25	mΩ	V_{GS} = 10V, I_D = 6A
		—	22	29		V_{GS} = 4.5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1.3A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	641	—	pF	V_{DS} = 15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	66	—		
Reverse Transfer Capacitance	C_{rss}	—	51	—		
Gate Resistance	R_G	—	2.2	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	6	—	nC	V_{DS} = 15V, I_D = 10A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	13.2	—		
Gate-Source Charge	Q_{gs}	—	1.7	—		
Gate-Drain Charge	Q_{gd}	—	2.2	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.3	—	nS	V_{GS} = 10V, V_{DD} = 15V, R_G = 6Ω, I_D = 1A
Turn-On Rise Time	t_r	—	4.4	—		
Turn-Off Delay Time	$t_{D(off)}$	—	22.3	—		
Turn-Off Fall Time	t_f	—	5.3	—		

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. UIS in production with L = 0.1mH, starting T_A = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

Electrical Characteristics – 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}	-30	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -24V, 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	$R_{DS(ON)}$	—	21	28	mΩ	V_{GS} = -10V, I_D = -6A
		—	29	38		V_{GS} = -4.5V, I_D = -5A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1.3A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1241	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	146	—		
Reverse Transfer Capacitance	C_{rss}	—	110	—		
Gate Resistance	R_G	—	14.8	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	10.9	—	nC	V_{DS} = -15V, I_D = -7A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	22	—		
Gate-Source Charge	Q_{gs}	—	3.5	—		
Gate-Drain Charge	Q_{gd}	—	4.7	—		
Turn-On Delay Time	$t_{D(on)}$	—	9.7	—	nS	V_{GS} = -10V, V_{DD} = -15V, R_{GEN} = 6Ω, I_D = -7A
Turn-On Rise Time	t_r	—	17.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	60.5	—		
Turn-Off Fall Time	t_f	—	40.4	—		

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

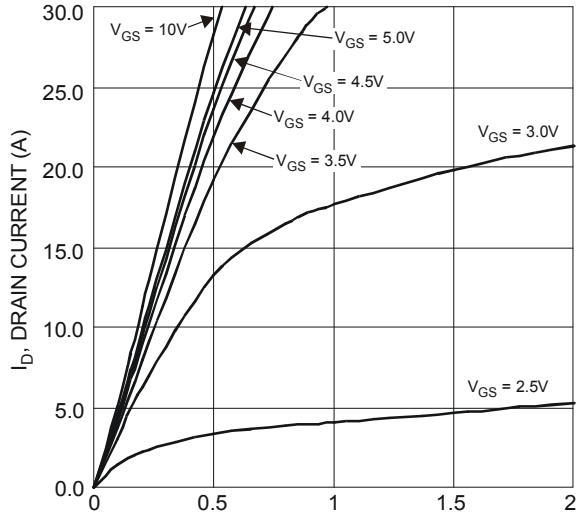


Figure 1 Typical Output Characteristics

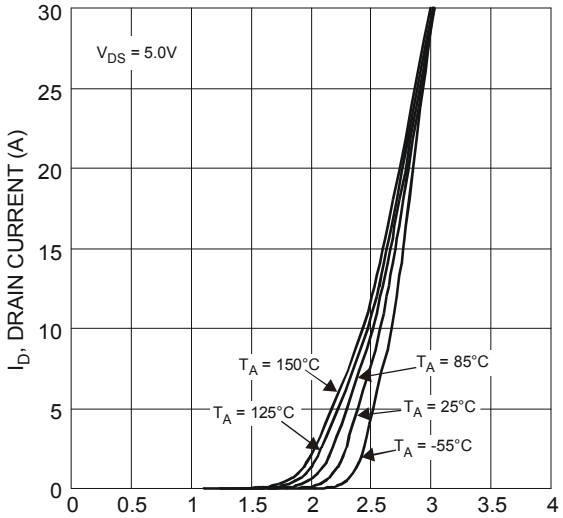


Figure 2 Typical Transfer Characteristics

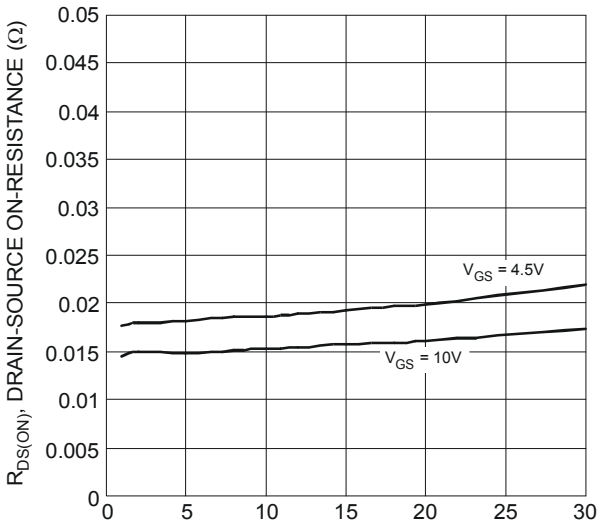


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

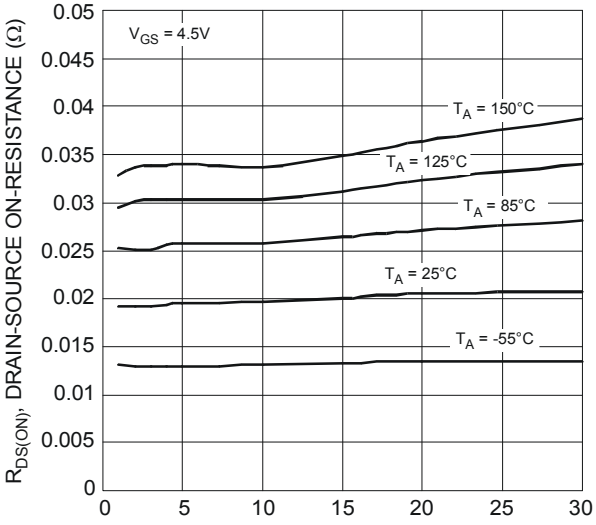


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

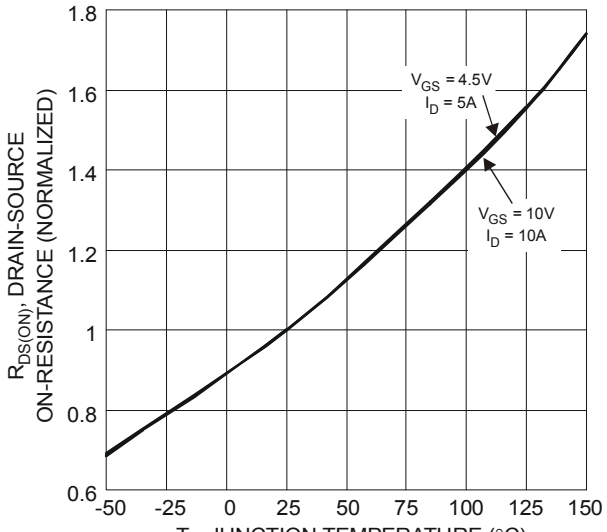


Figure 5 On-Resistance Variation with Temperature

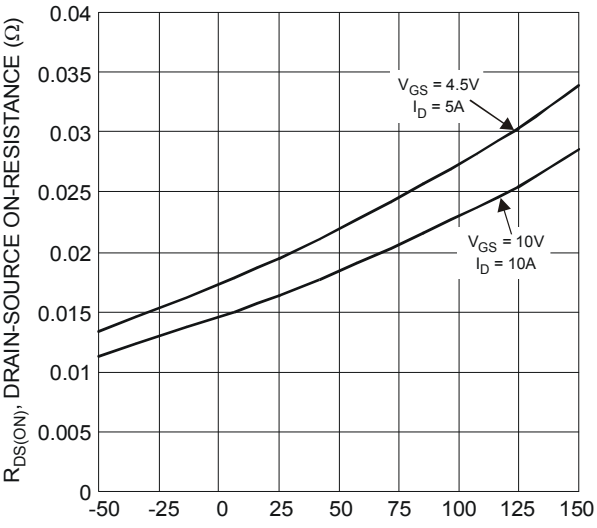


Figure 6 On-Resistance Variation with Temperature

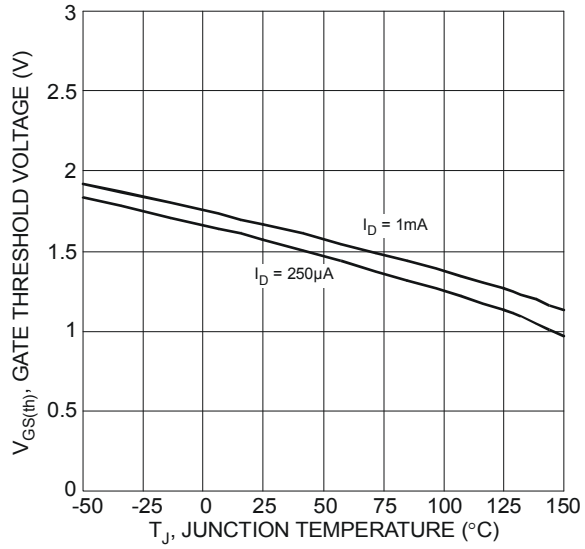


Figure 7 Gate Threshold Variation vs. Ambient Temperature

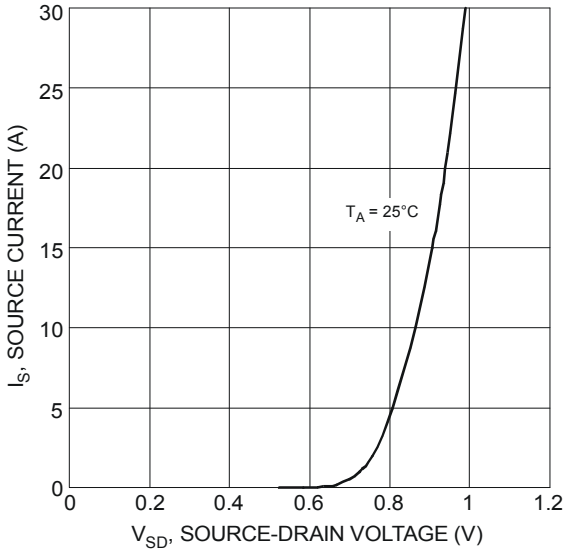


Figure 8 Diode Forward Voltage vs. Current

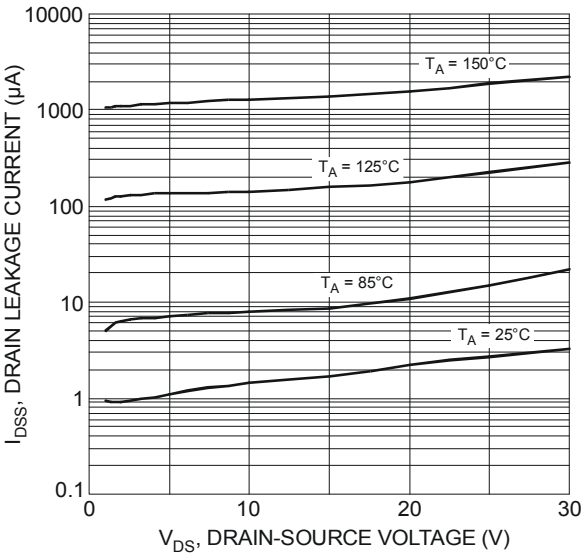


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

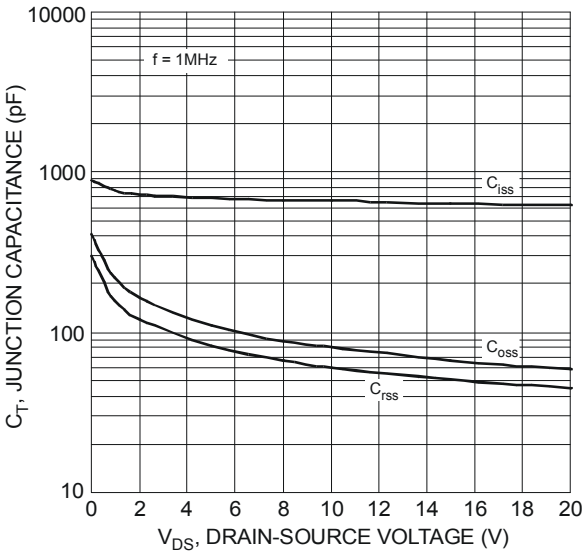


Figure 10 Typical Junction Capacitance

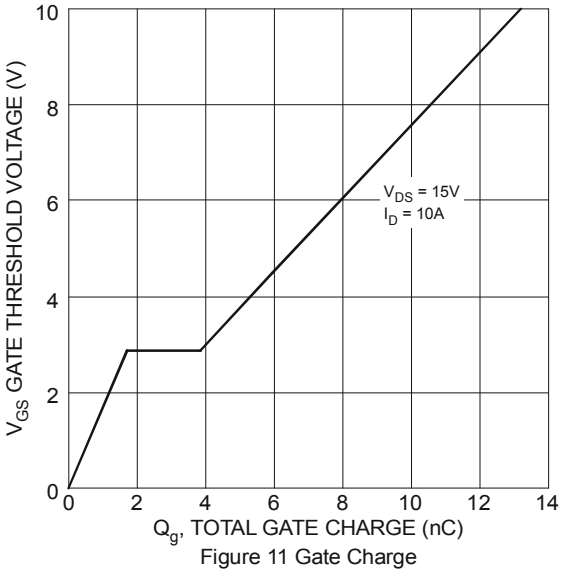


Figure 11 Gate Charge

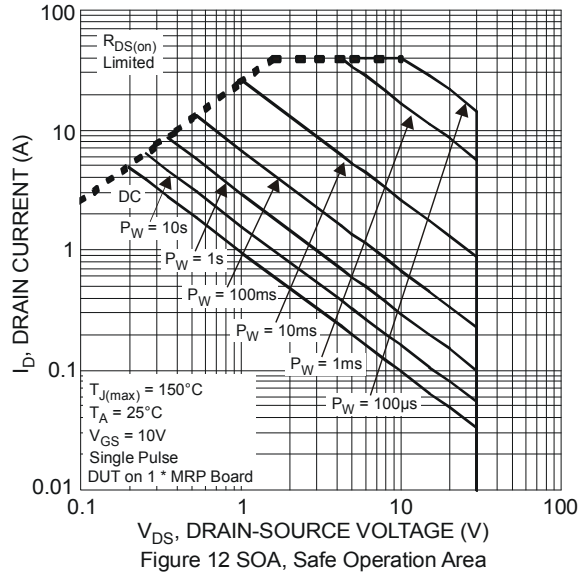


Figure 12 SOA, Safe Operation Area

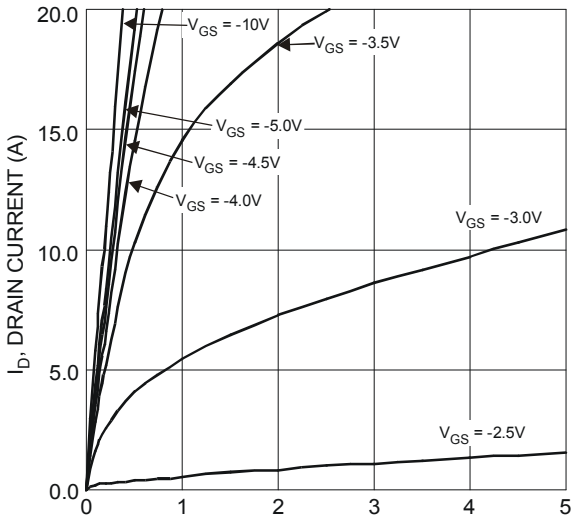


Figure 13 Typical Output Characteristics

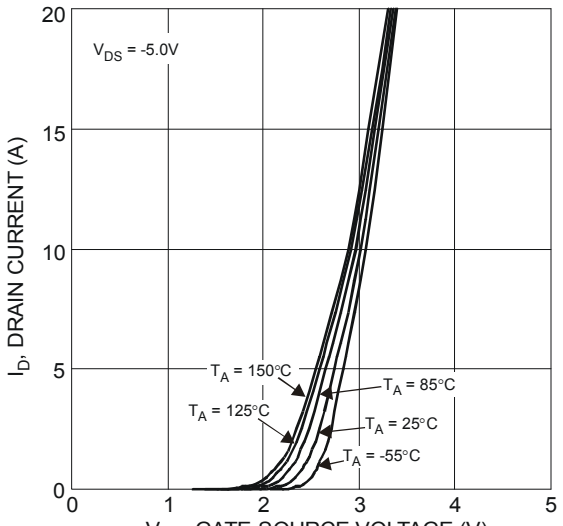


Figure 14 Typical Transfer Characteristics

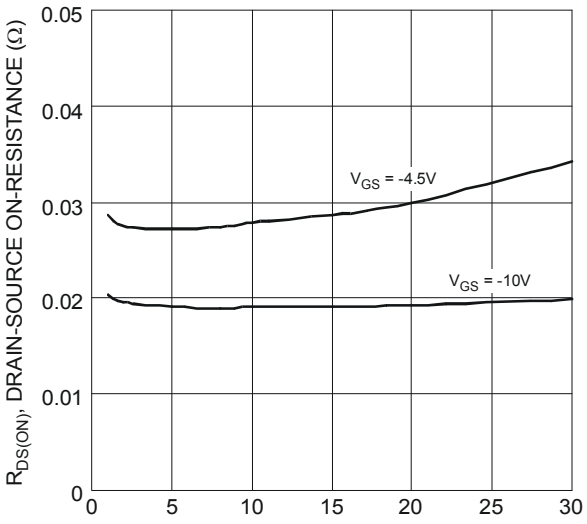


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

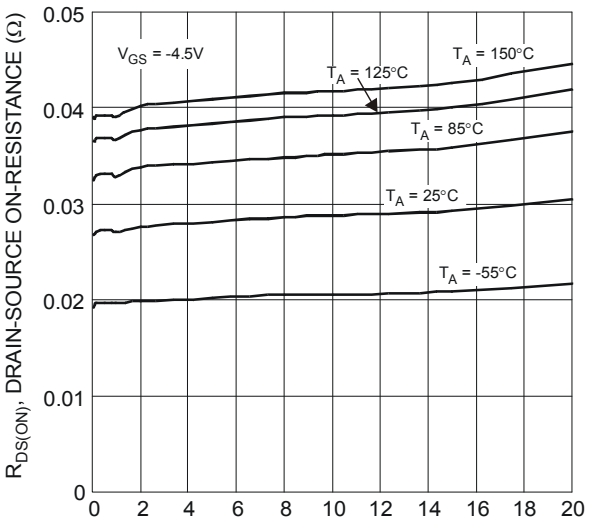


Figure 16 Typical On-Resistance vs. Drain Current and Temperature

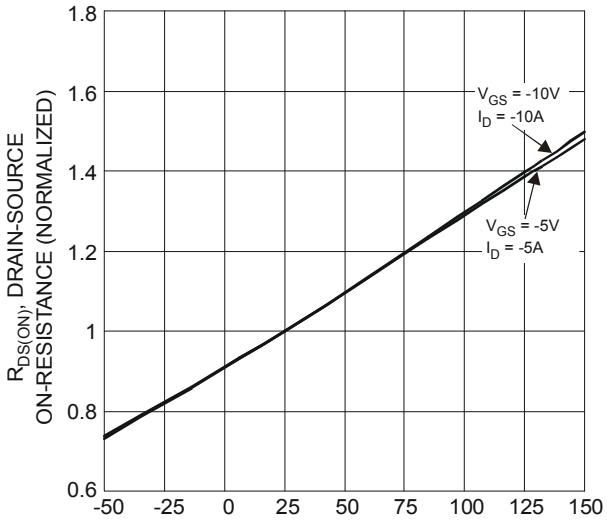


Figure 17 On-Resistance Variation with Temperature

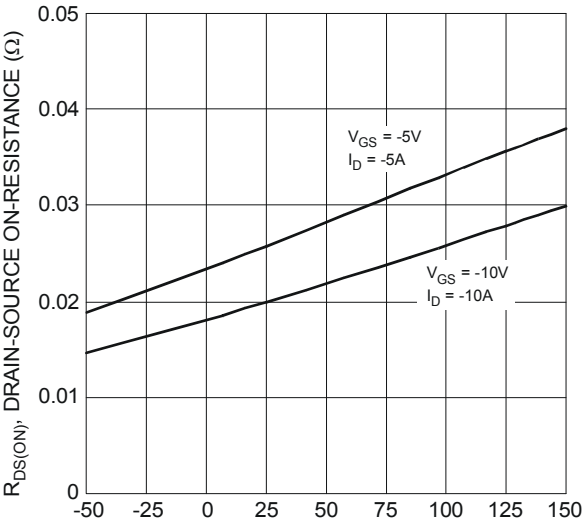


Figure 18 On-Resistance Variation with Temperature

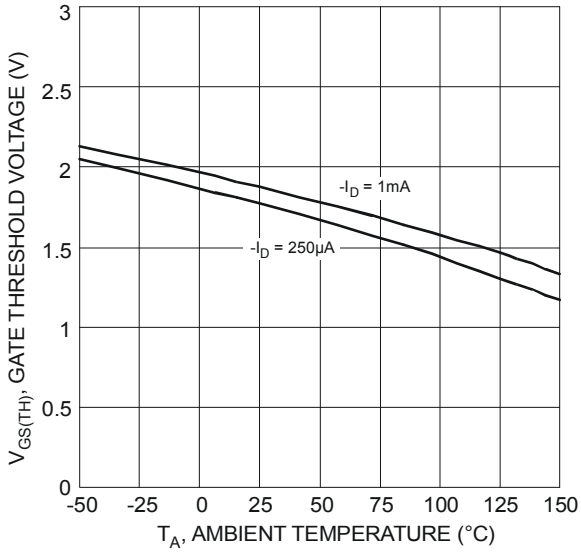


Figure 19 Gate Threshold Variation vs. Ambient Temperature

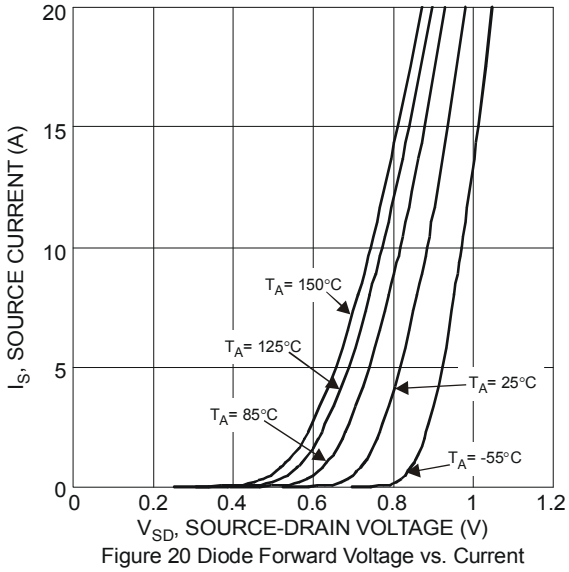


Figure 20 Diode Forward Voltage vs. Current

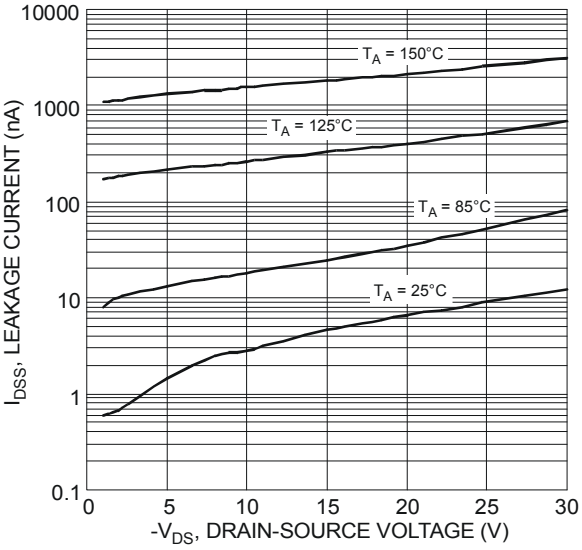


Figure 21 Typical Drain-Source Leakage Current vs. Voltage

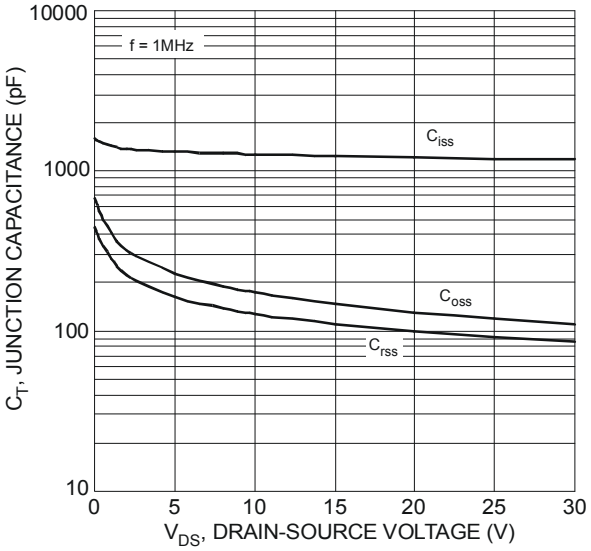


Figure 22 Typical Junction Capacitance

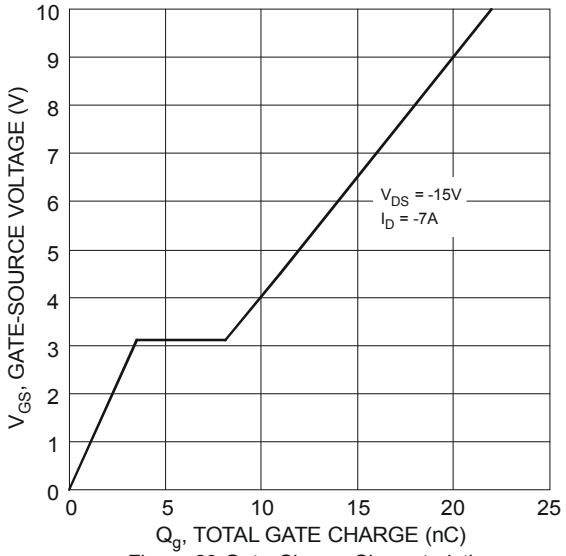


Figure 23 Gate-Charge Characteristics

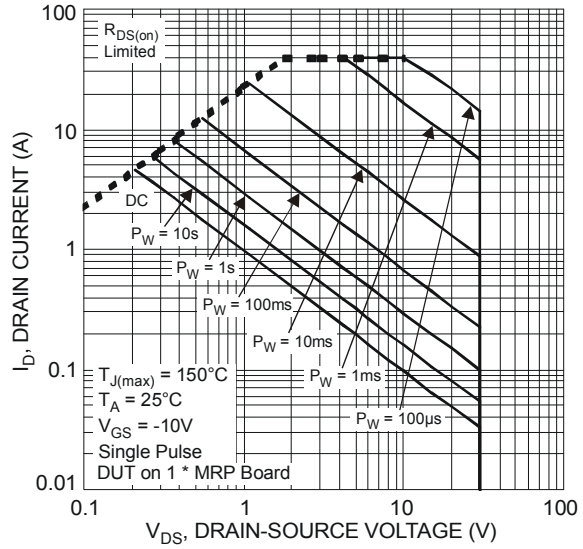


Figure 24 SOA, Safe Operation Area

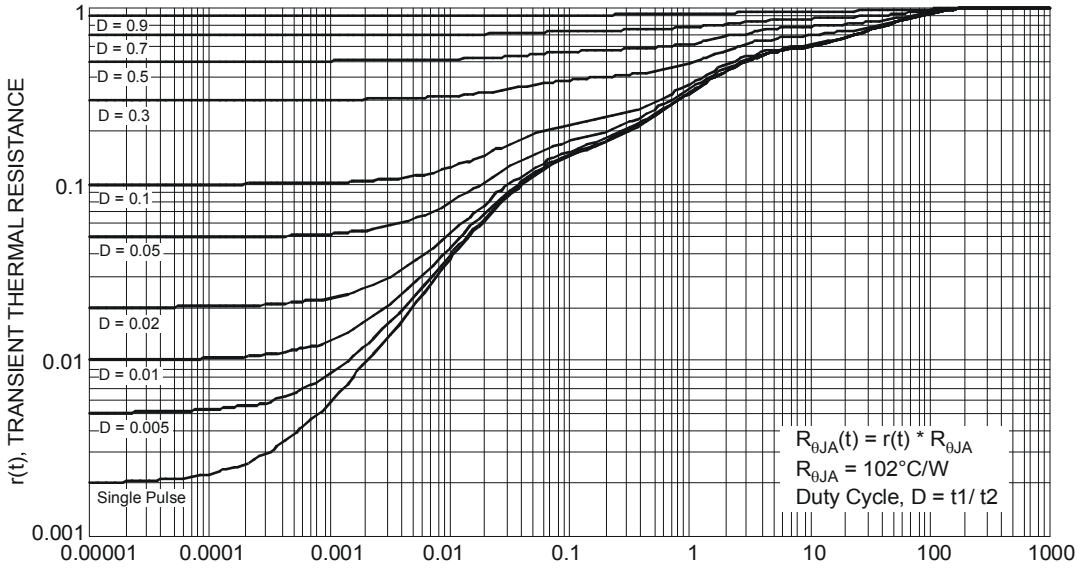
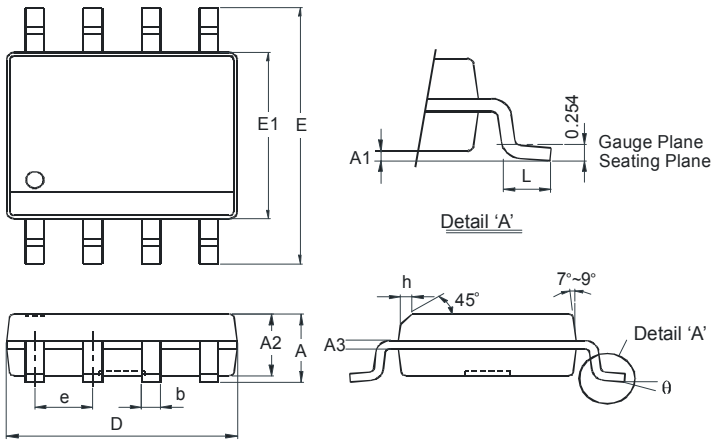


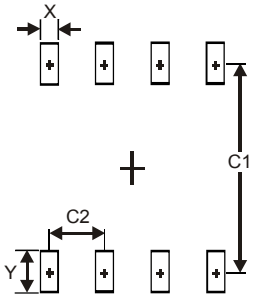
Figure 25 Transient Thermal Resistance

Package Outline Dimensions



SO-8		
Dim	**Min**	**Max**
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27