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

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	30	0.4Ω @ V_{GS} = 10V	0.8A
		0.7Ω @ V_{GS} = 4.5V	0.62A
Q2	-30	0.9Ω @ V_{GS} = -10V	-0.55A
		1.7Ω @ V_{GS} = -4.5V	-0.4A

Features and Benefits

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

Description and Applications

This 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.

- Motor control
- Power-management functions
- DC-DC converters

Mechanical Data

- Package: SOT363
- 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
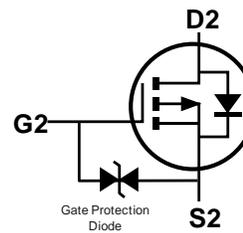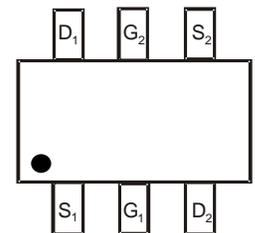- Weight: 0.027 grams (Approximate)

ESD PROTECTED

SOT363
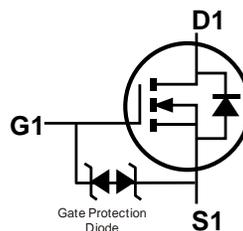
Top View

Q1 N-CHANNEL

Q2 P-CHANNEL

Top View Pinout

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

Characteristic			Symbol	Value_Q1	Value_Q2	Unit
Drain-Source Voltage			V_{DSS}	30	-30	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current (Note 6) Q1: V_{GS} = 10V Q2: V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	0.8 0.6	-0.55 -0.44	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	0.4	-0.38	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	4	-2.4	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	0.29	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	433	°C/W
Total Power Dissipation (Note 6)		P_D	0.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	301	°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 minimum recommended pad layout.
          6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0	µA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.8	1.2	1.6	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.2	0.4	Ω	V_{GS} = 10V, I_D = 0.59A
		—	0.3	0.7		V_{GS} = 4.5V, I_D = 0.2A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 0.1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	50	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	12	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	10	—	pF	
Gate Resistance	R_g	—	58	—	Ω	V_{DS} = V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	0.5	—	nC	V_{DS} = 10V, I_D = 250mA
Total Gate Charge (V_{GS} = 10V)	Q_g	—	1.2	—	nC	
Gate-Source Charge	Q_{gs}	—	0.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	V_{GS} = 10V, V_{DS} = 30V, I_D = 100mA, R_G = 25Ω
Turn-On Rise Time	t_R	—	3.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	16.8	—	ns	
Turn-Off Fall Time	t_F	—	13.8	—	ns	

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}	-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}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1	-2.2	-2.6	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.5	0.9	Ω	V_{GS} = -10V, I_D = -0.42A
		—	0.78	1.7		V_{GS} = -4.5V, I_D = -0.2A
Diode Forward Voltage	V_{SD}	—	-0.8	-1.2	V	V_{GS} = 0V, I_S = -0.23A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	19	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	16	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	3	—	pF	
Gate Resistance	R_g	—	729	—	Ω	V_{DS} = V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	0.36	—	nC	V_{DS} = -10V, I_D = -0.24A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	0.8	—	nC	
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	30	—	ns	V_{GS} = -10V, V_{DD} = -15V, I_D = -0.5A, R_G = 1Ω
Turn-On Rise Time	t_R	—	74	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	28	—	ns	
Turn-Off Fall Time	t_F	—	31	—	ns	

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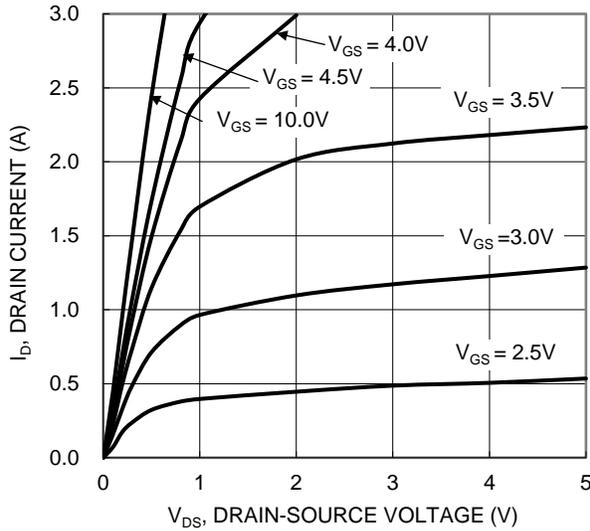
Typical Characteristics - N-CHANNEL

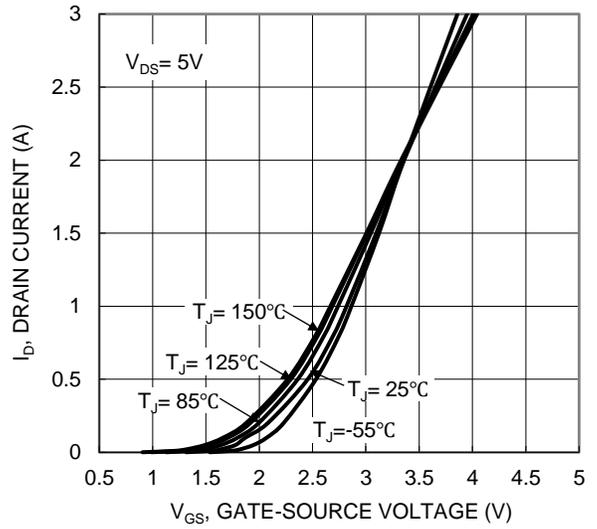Figure 1.Typical Output Characteristic

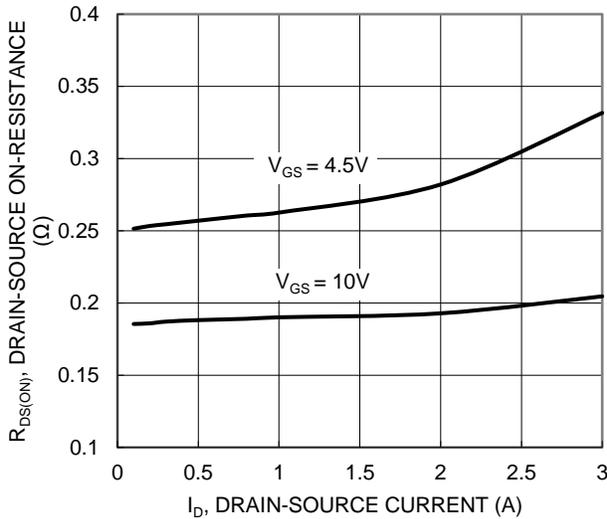Figure 2. Typical Transfer Characteristic

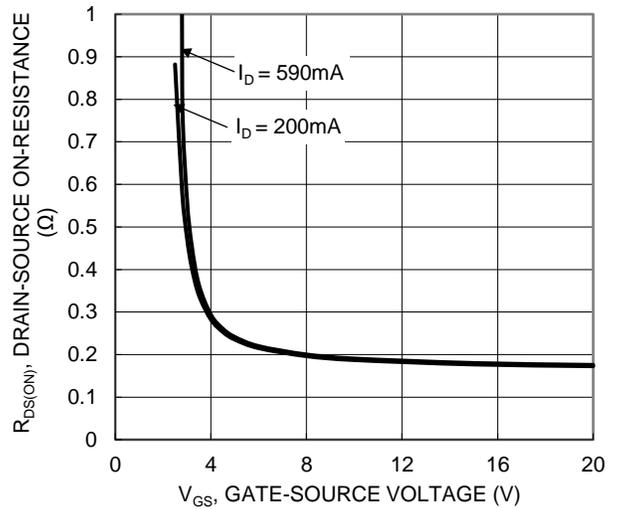Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

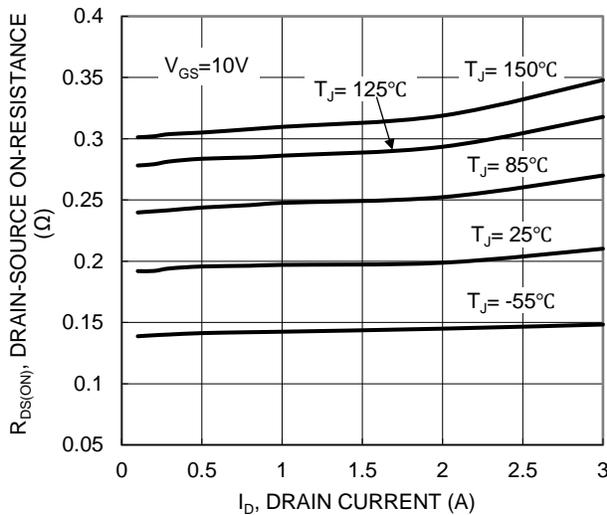Figure 4. Typical Transfer Characteristic

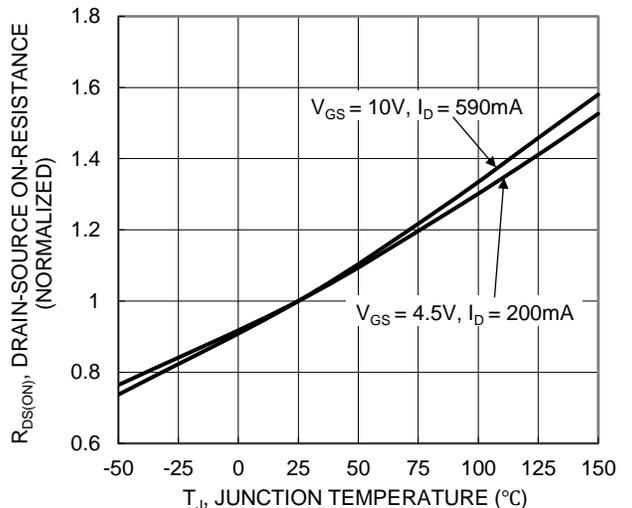Figure 5. Typical On-Resistance vs. Drain Current and Temperature

Figure 6. On-Resistance Variation with Temperature
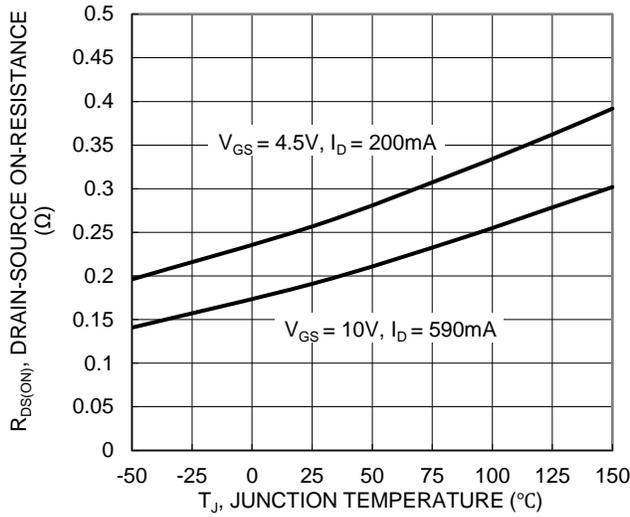
Typical Characteristics - N-CHANNEL (continued)
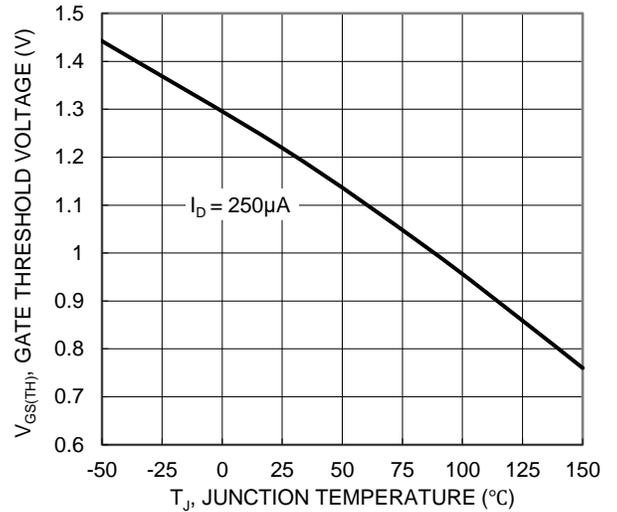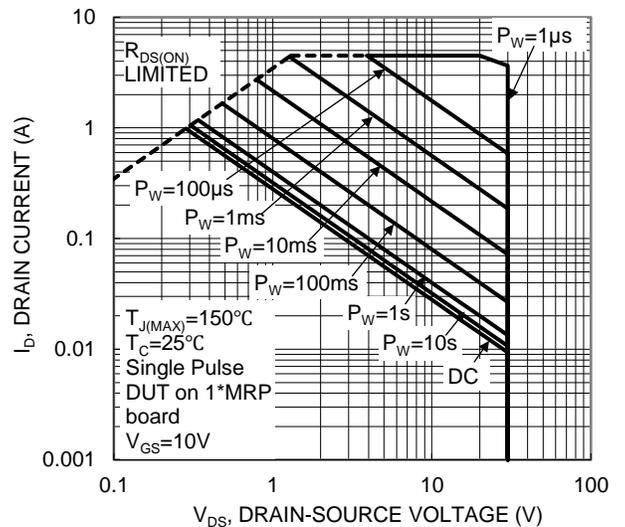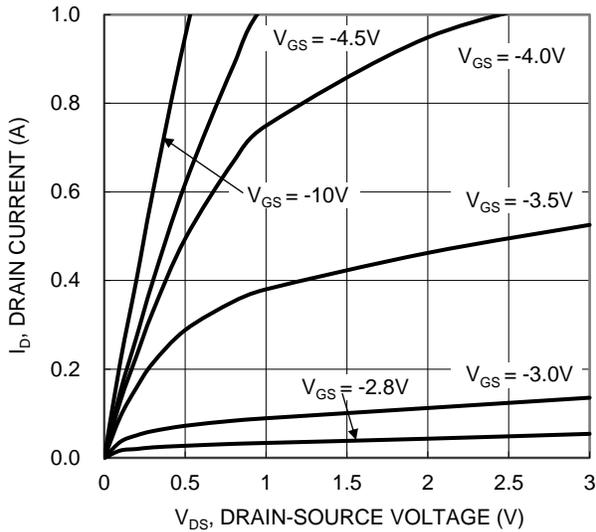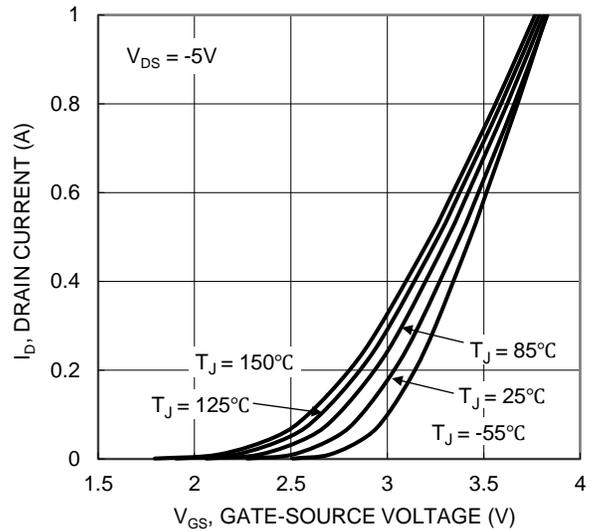

Figure 7. On-Resistance Variation with Temperature

Figure 8. Gate Threshold Variation vs. JunctionTemperature
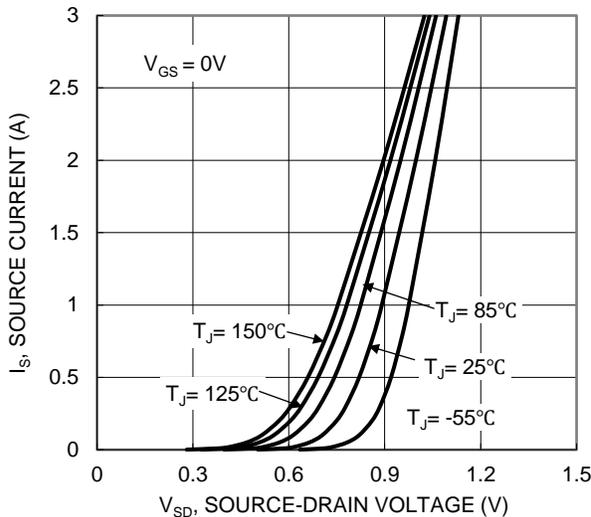
Figure 9. Diode Forward Voltage vs. Current
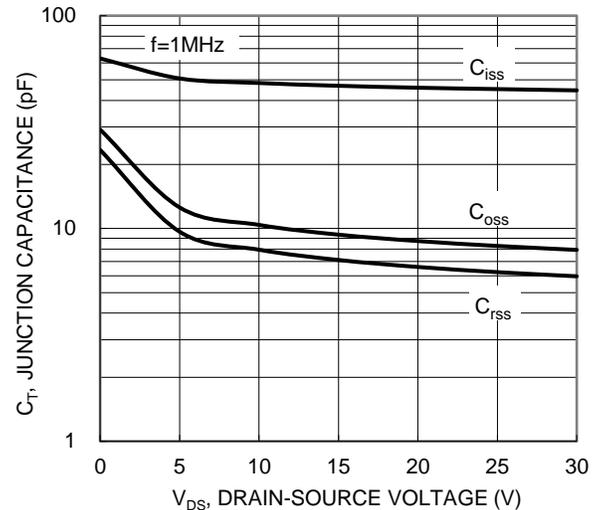
Figure 10. Typical Junction Capacitance
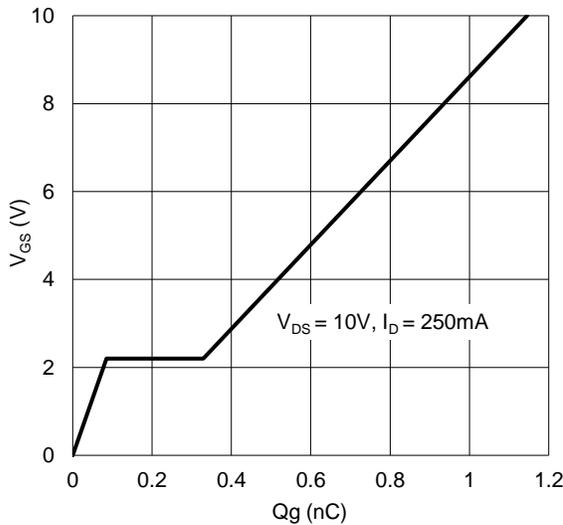
Figure 11. Gate Charge

Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

Figure 13. Typical Output Characteristic

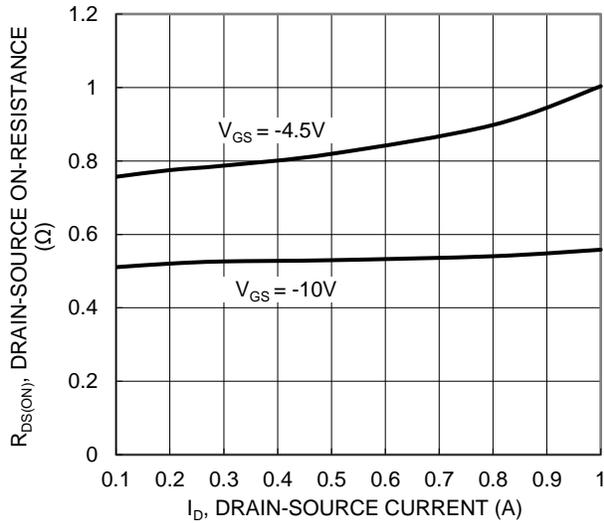Figure 14. Typical Transfer Characteristic

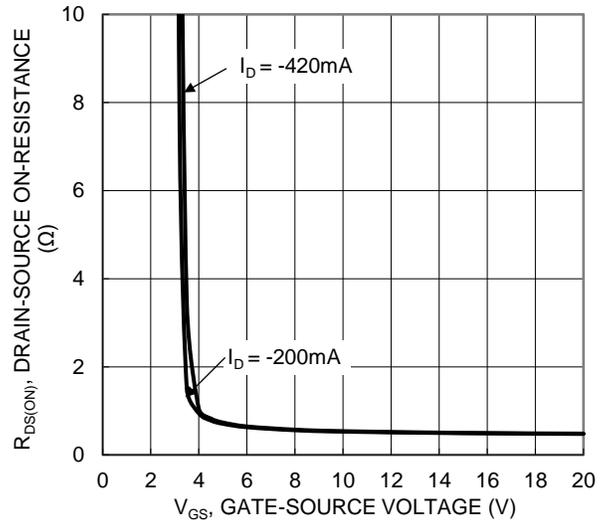Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

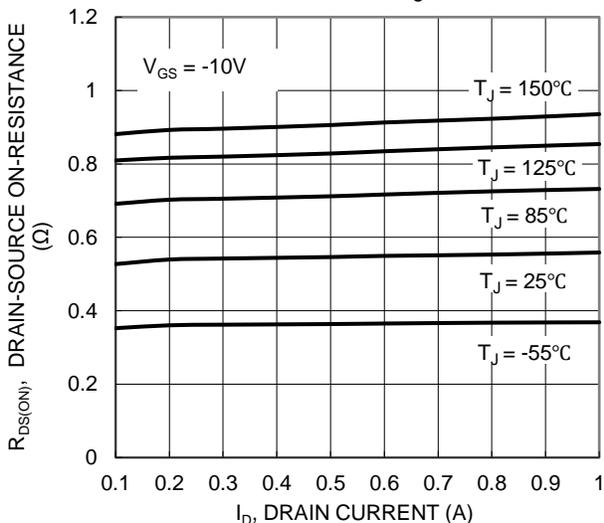Figure 16. Typical Transfer Characteristic

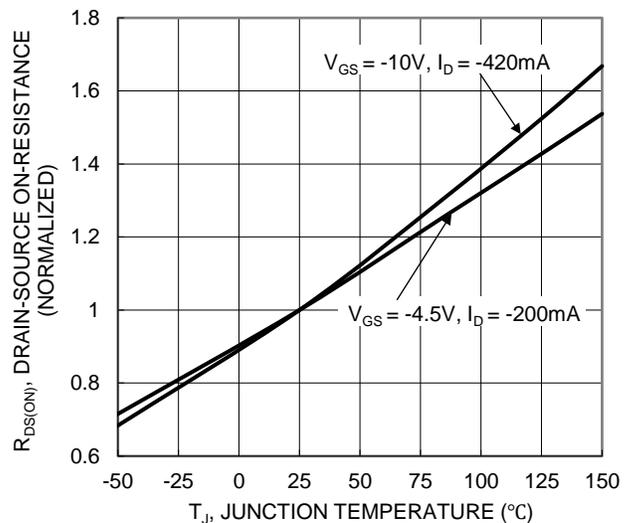Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

Figure 18. On-Resistance Variation with Junction Temperature
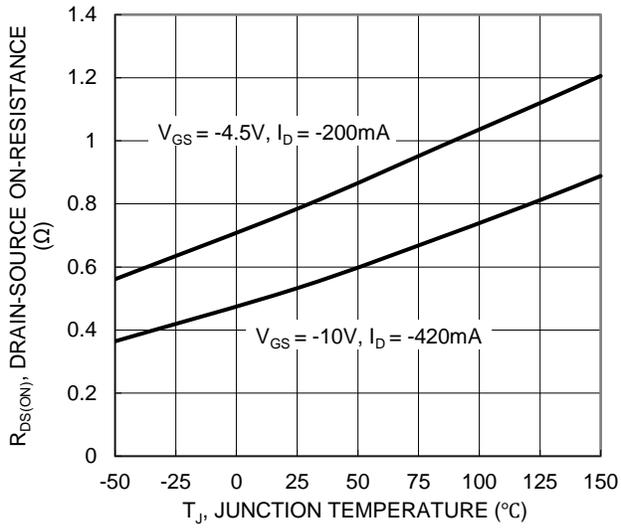
Typical Characteristics - P-CHANNEL (continued)
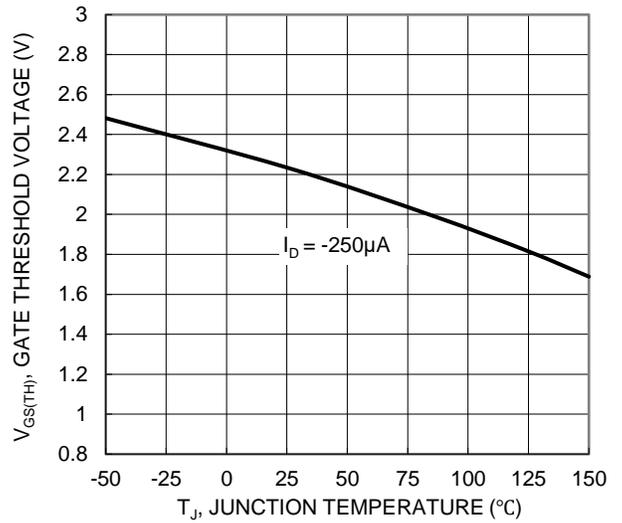
Figure 19. On-Resistance Variation with Junction Temperature

V_{GS} = -4.5V, I_D = -200mA

V_{GS} = -10V, I_D = -420mA

Figure 20. Gate Threshold Variation vs. Junction Temperature

I_D = -250μA
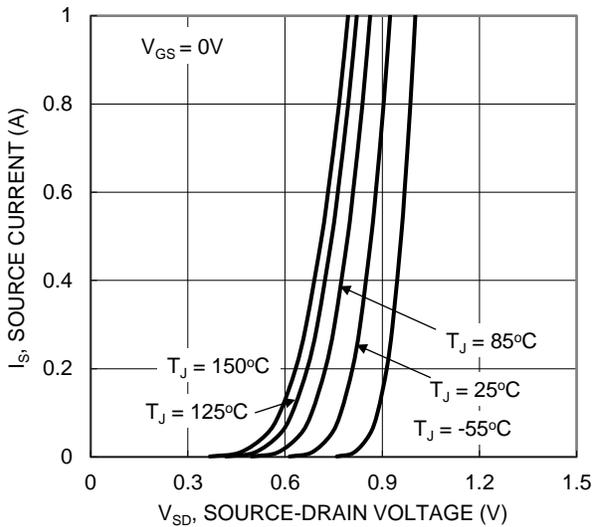
Figure 21. Diode Forward Voltage vs. Current

V_{GS} = 0V

T_J = 150°C
T_J = 125°C
T_J = 85°C
T_J = 25°C
T_J = -55°C
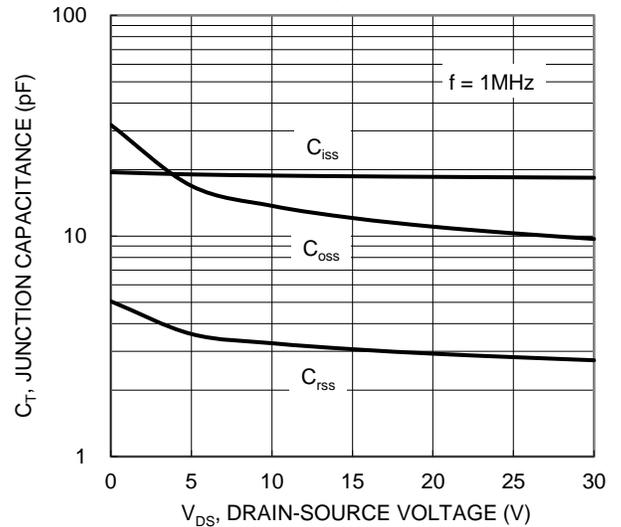
Figure 22. Typical Junction Capacitance

f = 1MHz

C_{iss}
C_{oss}
C_{rss}
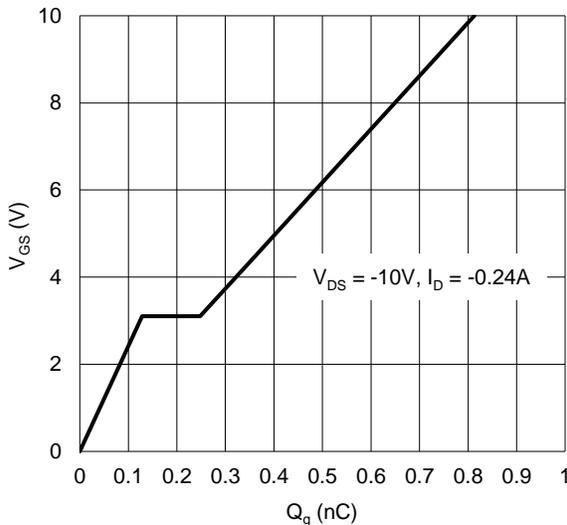
Figure 23. Gate Charge

V_{DS} = -10V, I_D = -0.24A
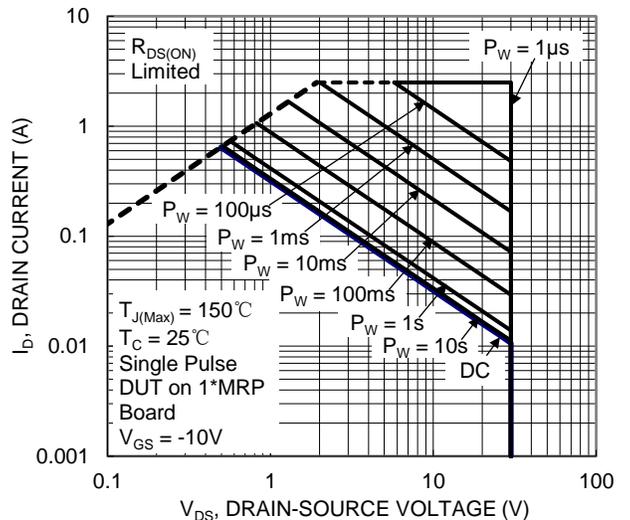
Figure 24. SOA, Safe Operation Area

$R_{DS(ON)}$ Limited

P_W = 1μs
P_W = 100μs
P_W = 1ms
P_W = 10ms
P_W = 100ms
P_W = 1s
P_W = 10s
DC

$T_{J(Max)}$ = 150°C
T_C = 25°C
Single Pulse
DUT on 1*MRP
Board
V_{GS} = -10V
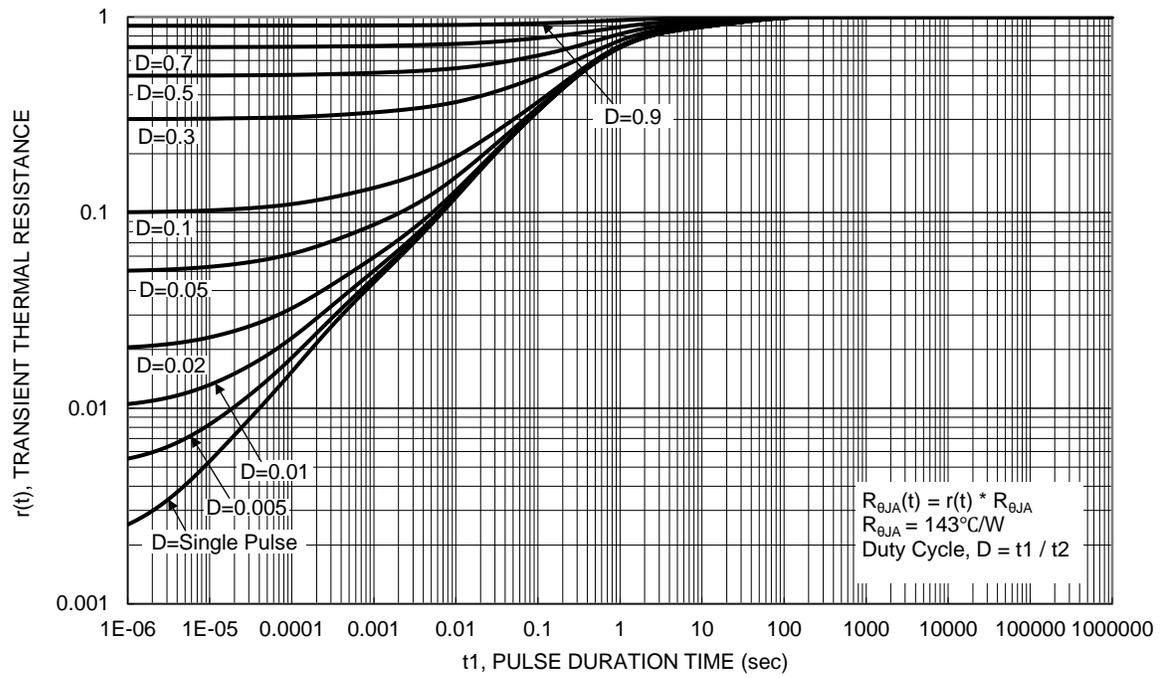
Figure 25. Transient Thermal Resistance

Within the figure:

y-axis: r(t), TRANSIENT THERMAL RESISTANCE

x-axis: t1, PULSE DURATION TIME (sec)

Curve labels: D=0.9, D=0.7, D=0.5, D=0.3, D=0.1, D=0.05, D=0.02, D=0.01, D=0.005, D=Single Pulse

$R_{\theta JA}(t) = r(t) * R_{\theta JA}$
$R_{\theta JA} = 143°C/W$
Duty Cycle, D = t1 / t2

Package Outline Dimensions

SOT363
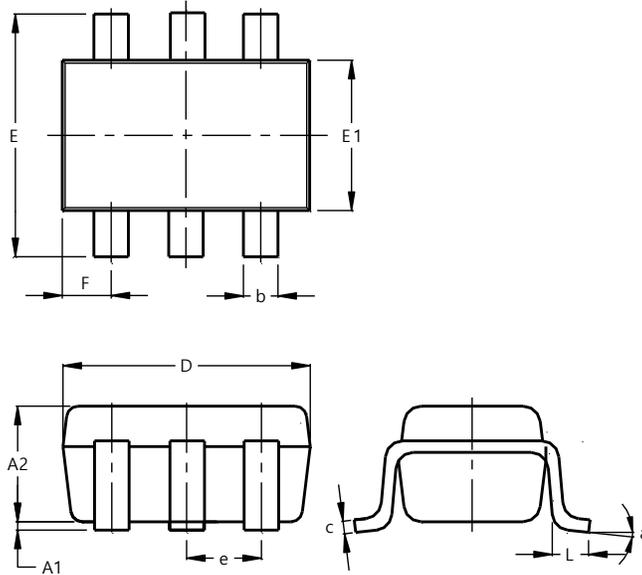
SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

SOT363
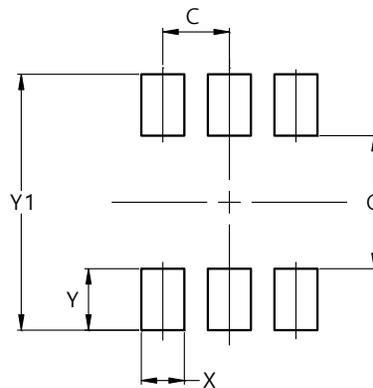
Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500