晶丰明源半导体

BPM0303CS

30V Complementary MOSFET

General Description

The BPM0303CS uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs can be used in a wide variety of applications.

Application

- H-bridge
- Inverters

Features

- **N-Channel**
  V_{DS} =30V, I_D =3.5A
  $R_{DS(ON)}$ < 58mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 95mΩ @ V_{GS}=4.5V
- **P-Channel**
  V_{DS} =-30V, I_D = -2.7A
  $R_{DS(ON)}$ < 100mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ < 150mΩ @ V_{GS}=-4.5V
- High power and current handing capability

Typical Application

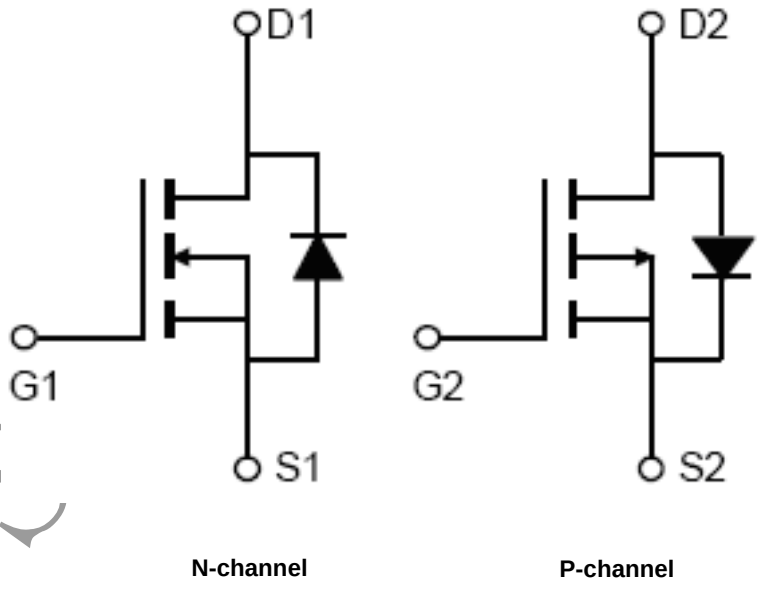


Figure 1. Schematic Diagram

Ordering Information

Part Number	Package	Operating Temperature	Packing Type	Marking
BPM0303CS	SOT23-6L	-40 ℃ to 105 ℃	Tape & Reel 3,000pcs/Reel	0303

Pin Configuration and Marking Information

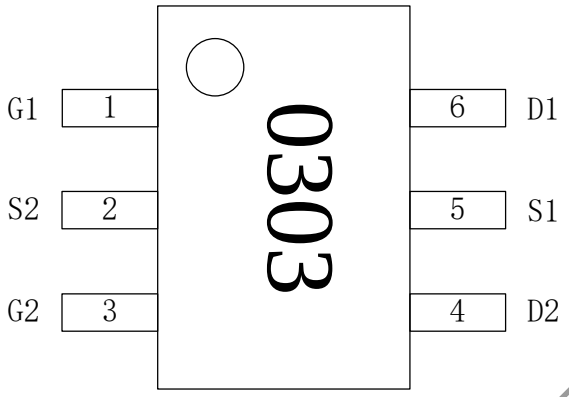


Figure 2. Pin Configuration

Pin Definition

Pin No.	Name	Description
1	G1	NMOS Gate
2	S2	PMOS Source
3	G2	PMOS Gate
4	D2	PMOS Drain
5	S1	NMOS Source
6	D1	NMOS Drain

Absolute Maximum Rating (note 1) (Unless otherwise specified, T_A=25℃)

Symbol	Parameter		N-Channel	P-Channel	Unit
V_{DS}	Drain-Source Voltage		30	-30	V
V_{GS}	Gate-Source Voltage		±20	±20	V
I_D	Continuous Drain Current	T_C=25℃	3.5	-2.7	A
		T_C=70℃	3	-2.1	
I_{DM}	Pulsed Drain Current (note 2)		20	-15	A
P_D	Maximum Power Dissipation	T_C=25℃	1.2	1.2	W
T_J,T_{STG}	Operating Junction and Storage Temperature Range		-55 to 150	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (note 3)		104	104	℃/W

Note 1: *Stress beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. Under "recommended operating conditions" the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by the test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.*

Note 2: *Repetitive Rating: Pulse width limited by maximum junction temperature.*

Note 3: *Surface Mounted on FR4 Board, t ≤ 10 sec.*

N-Channel Electrical Characteristics(note 4, 5)（Unless otherwise specified, T_A=25℃）

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	30	33	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 6)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.2	1.5	2.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=3.5A	-	36	58	mΩ
		V_{GS}=4.5V, I_D=2A	-	60	95	
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=3.1A	-	4	-	S
Dynamic Characteristics (Note7)						
C_{lss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, F=1.0MHz	-	210	-	PF
C_{oss}	Output Capacitance		-	35	-	PF
C_{rss}	Reverse Transfer Capacitance		-	23	-	PF
Switching Characteristics (Note 7)						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=15V, R_L=3Ω V_{GS}=10V, R_{GEN}=6Ω	-	4.5	-	nS
t_r	Turn-on Rise Time		-	1.5	-	nS
$t_{d(off)}$	Turn-Off Delay Time		-	18.5	-	nS
t_f	Turn-Off Fall Time		-	15.5	-	nS
Q_g	Total Gate Charge	V_{DS}=15V, I_D=3.5A, V_{GS}=10V	-	5	-	nC
Q_{gs}	Gate-Source Charge		-	0.55	-	nC
Q_{gd}	Gate-Drain Charge		-	1	-	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage (Note 6)	V_{GS}=0V, I_S=3.5A	-	0.8	1.2	V
I_S	Diode Forward Current (Note 3)		-	-	3.5	A

P-Channel Electrical Characteristics(note 4, 5)（Unless otherwise specified, T_A=25℃）

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-30	-33	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 6)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.6	-2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-2.7A	-	69	100	mΩ
		V_{DS}=-4.5V, I_D=-2A	-	110	150	
g_{FS}	Forward Transconductance	V_{DS}=-10V, I_D=-2.7A	-	2	-	S
Dynamic Characteristics (Note7)						
C_{lss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, F=1.0MHz	-	199	-	PF
C_{oss}	Output Capacitance		-	47	-	PF
C_{rss}	Reverse Transfer Capacitance		-	28	-	PF
Switching Characteristics (Note 7)						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-15V, R_L=15Ω V_{GS}=-10V, R_{GEN}=6Ω	-	8	-	nS
t_r	Turn-on Rise Time		-	5	-	nS
$t_{d(off)}$	Turn-Off Delay Time		-	12	-	nS
t_f	Turn-Off Fall Time		-	4	-	nS
Q_g	Total Gate Charge	V_{DS}=-15V, I_D=-2.7A, V_{GS}=-10V	-	5	-	nC
Q_{gs}	Gate-Source Charge		-	0.7	-	nC
Q_{gd}	Gate-Drain Charge		-	1.1	-	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage (Note 6)	V_{GS}=0V, I_S=-2.7A	-	-0.8	-1.2	V
I_S	Diode Forward Current (Note 3)		-	-	-2.7	A

Note 4: *Production testing of the chip is performed at 25°C.*

Note 5: *The maximum and minimum parameters specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis.*

Note 6: *Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.*

Note 7: *Guaranteed by design, not subject to production*

N-Channel Typical Electrical and Thermal Characteristics Curves

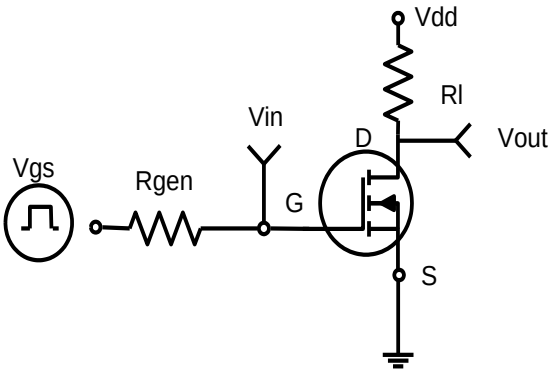


Figure 3. Switching Test Circuit

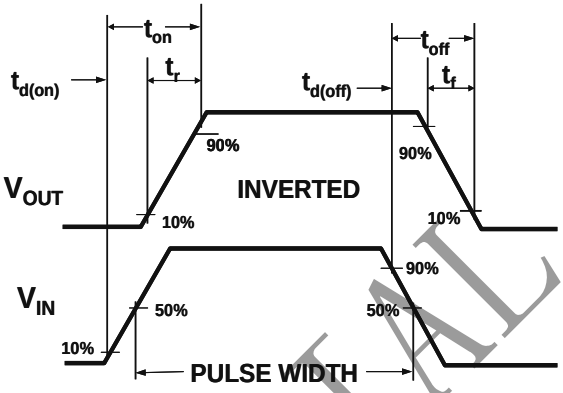


Figure 4. Switching Waveforms

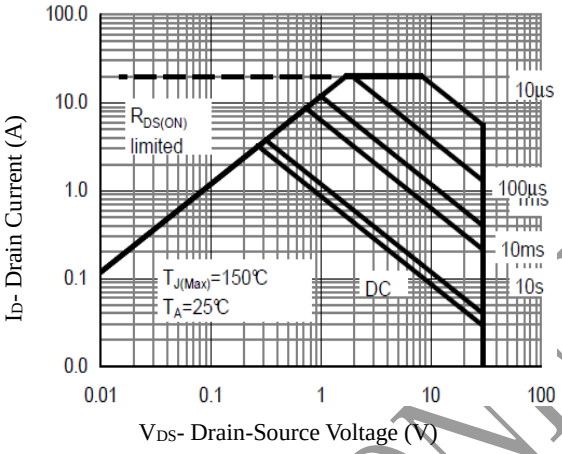


Figure 5. Safe Operation Area

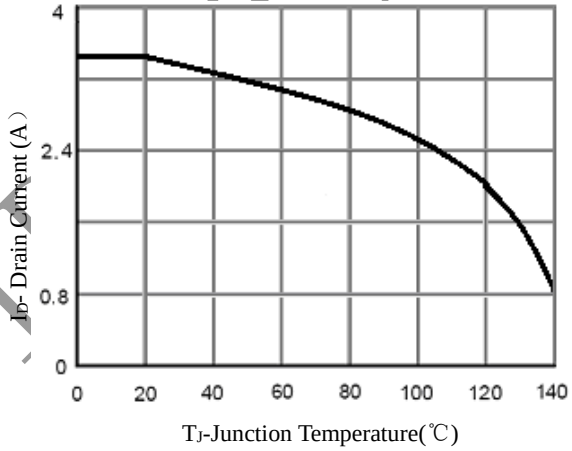


Figure 6. Drain Current

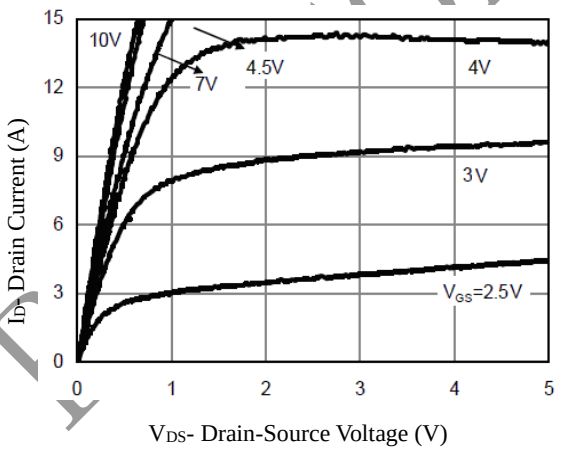


Figure 7. Output Characteristics

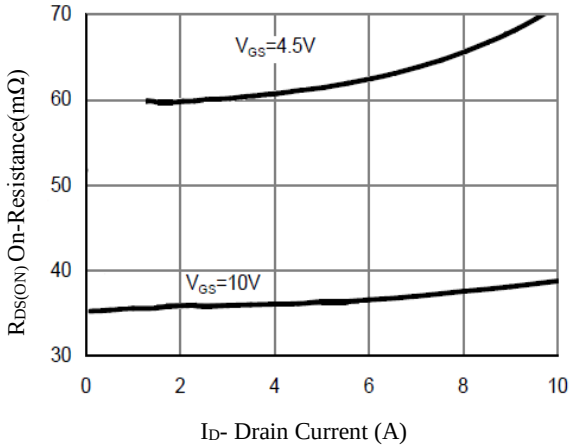


Figure 8. Drain-Source On-Resistance

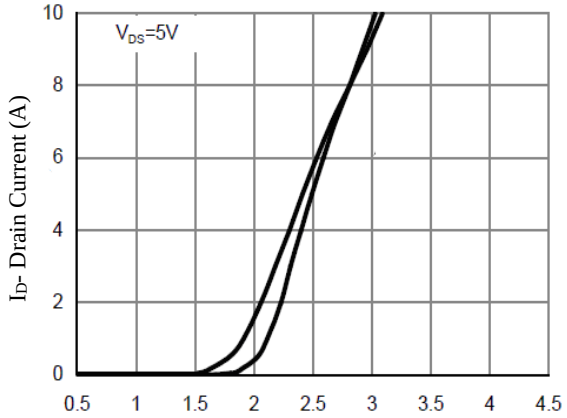


Figure 9. Transfer Characteristics

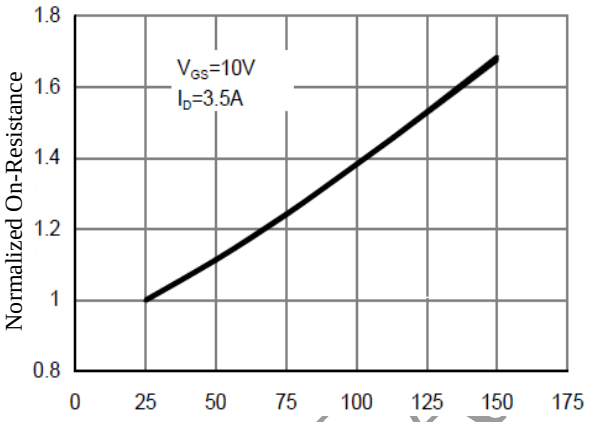


Figure 10. Drain-Source On-Resistance

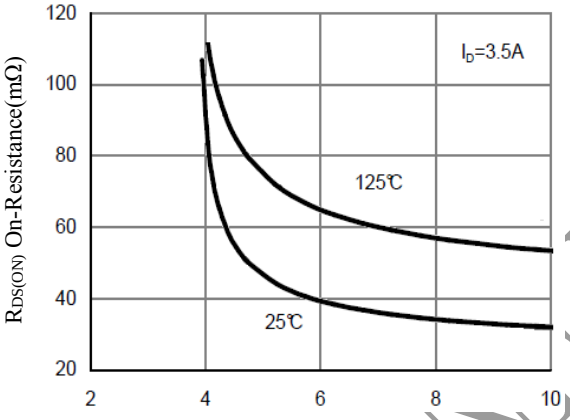


Figure 11. $R_{DS(ON)}$ vs V_{GS}

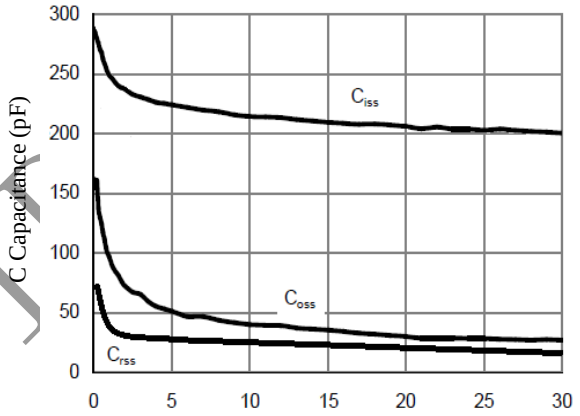


Figure 12. Capacitance vs V_{DS}

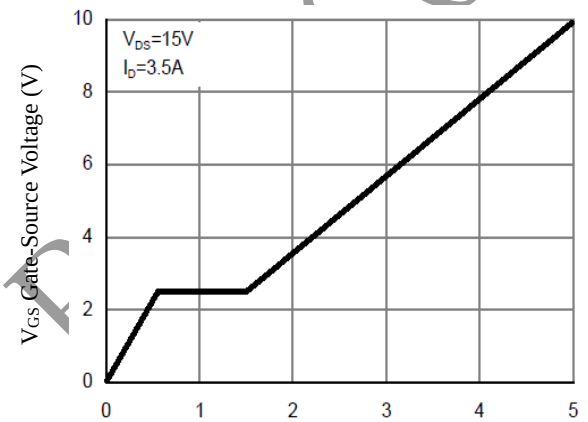


Figure 13. Gate Charge

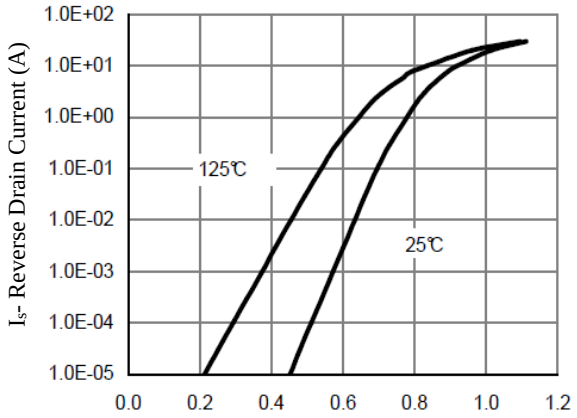


Figure 14. Source- Drain Diode Forward

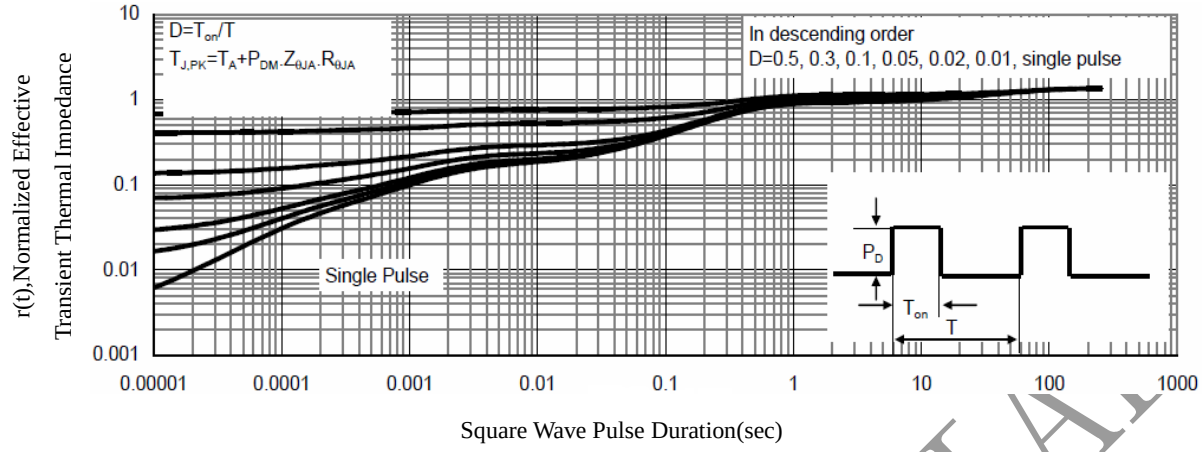


Figure 15. Normalized Maximum Transient Thermal Impedance

P-Channel Typical Electrical and Thermal Characteristics Curves

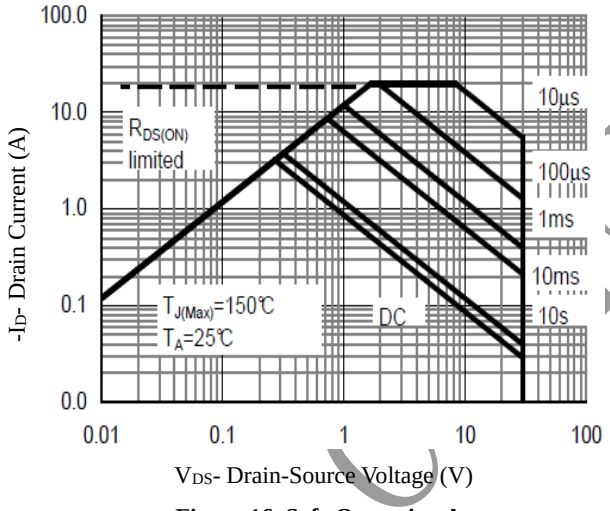


Figure 16. Safe Operation Area

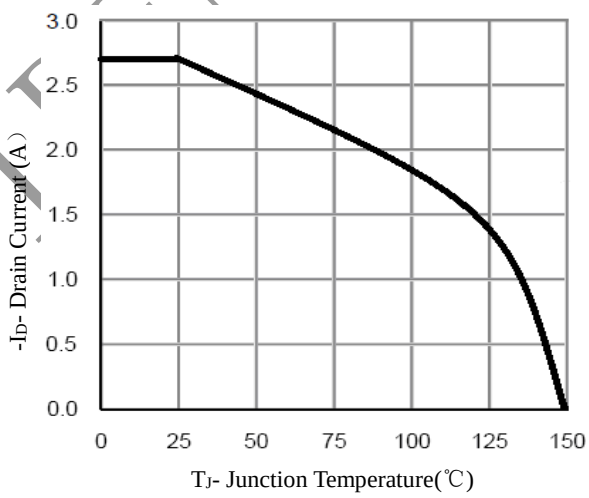


Figure 17. Drain Current

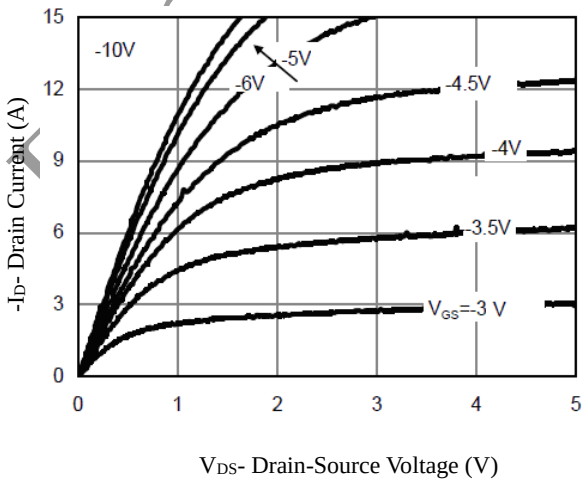


Figure 18. Output Characteristics

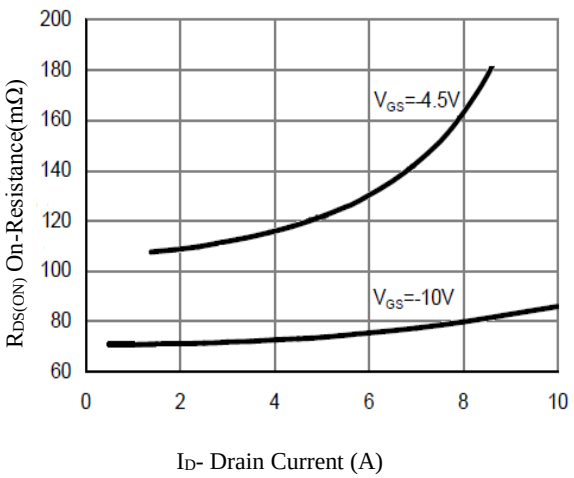


Figure 19. Drain-Source On-Resistance

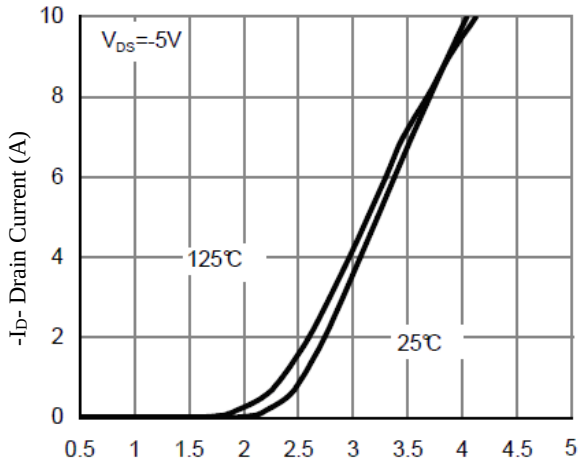


Figure 20. Transfer Characteristics

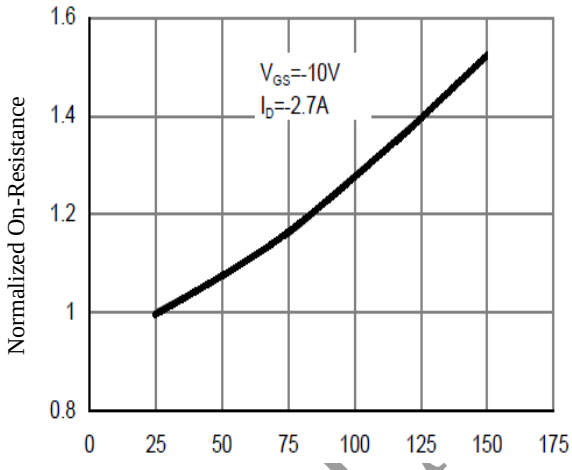


Figure 21. Drain-Source On-Resistance

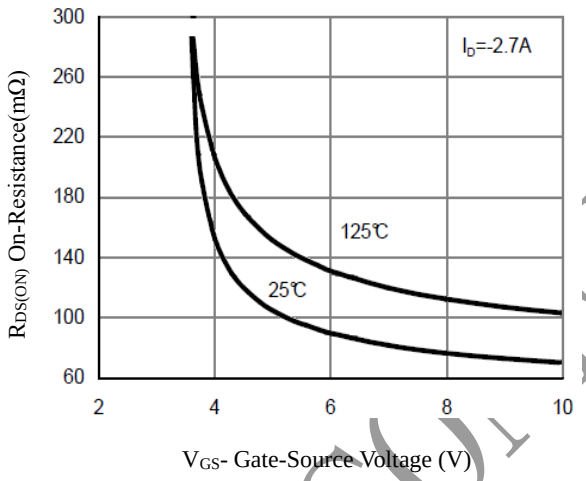


Figure 22. $R_{DS(ON)}$ vs V_{GS}

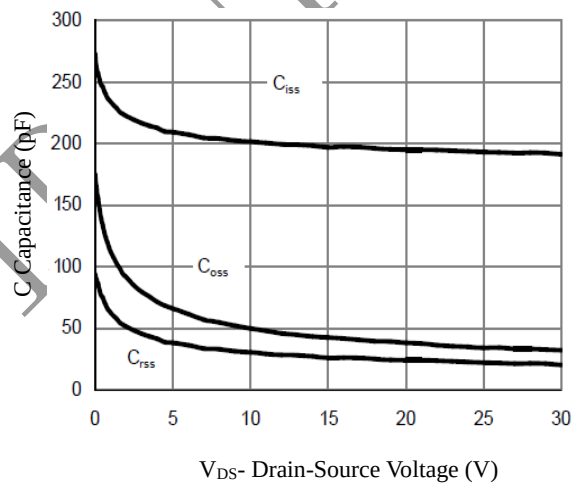


Figure 23. Capacitance vs V_{DS}

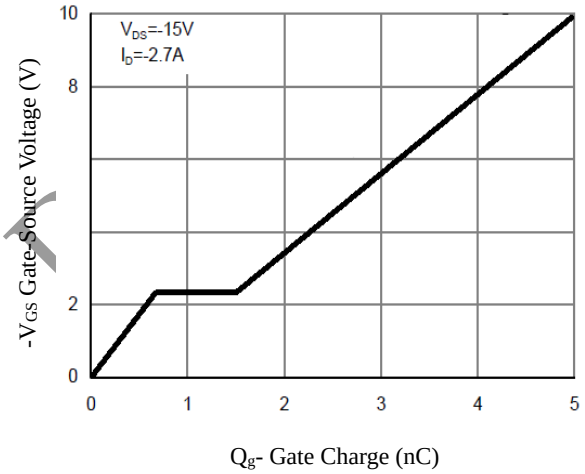


Figure 24. Gate Charge

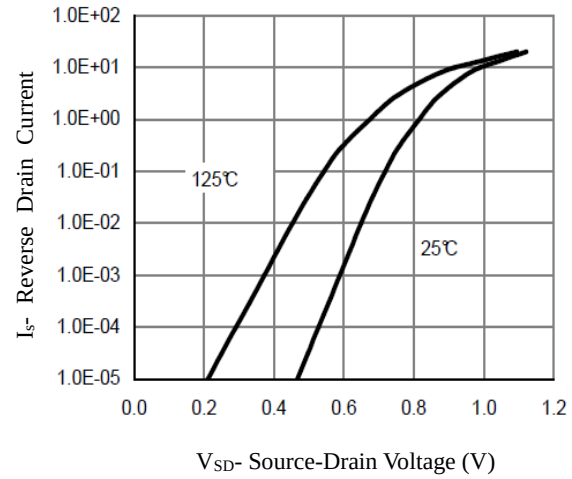


Figure 25. Source- Drain Diode Forward

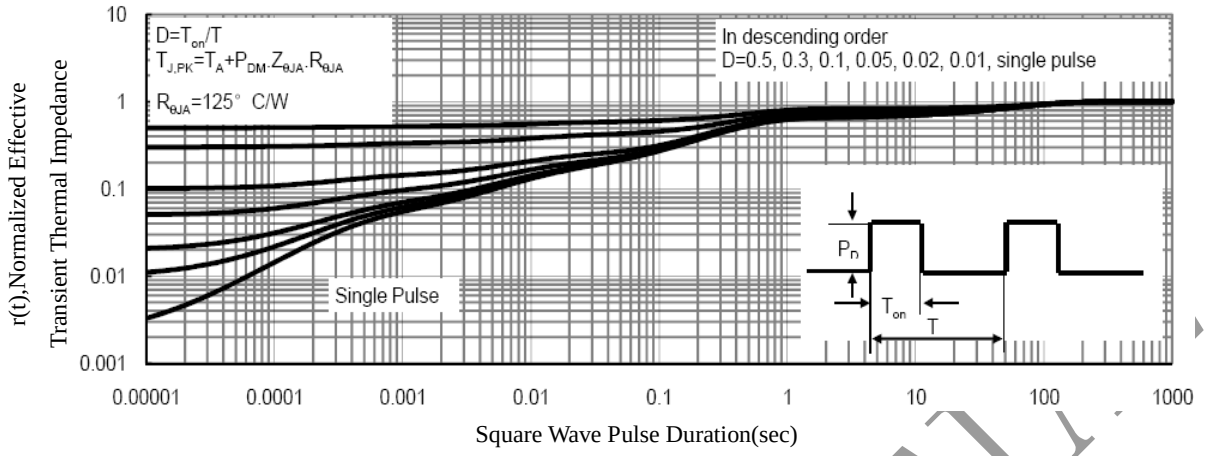
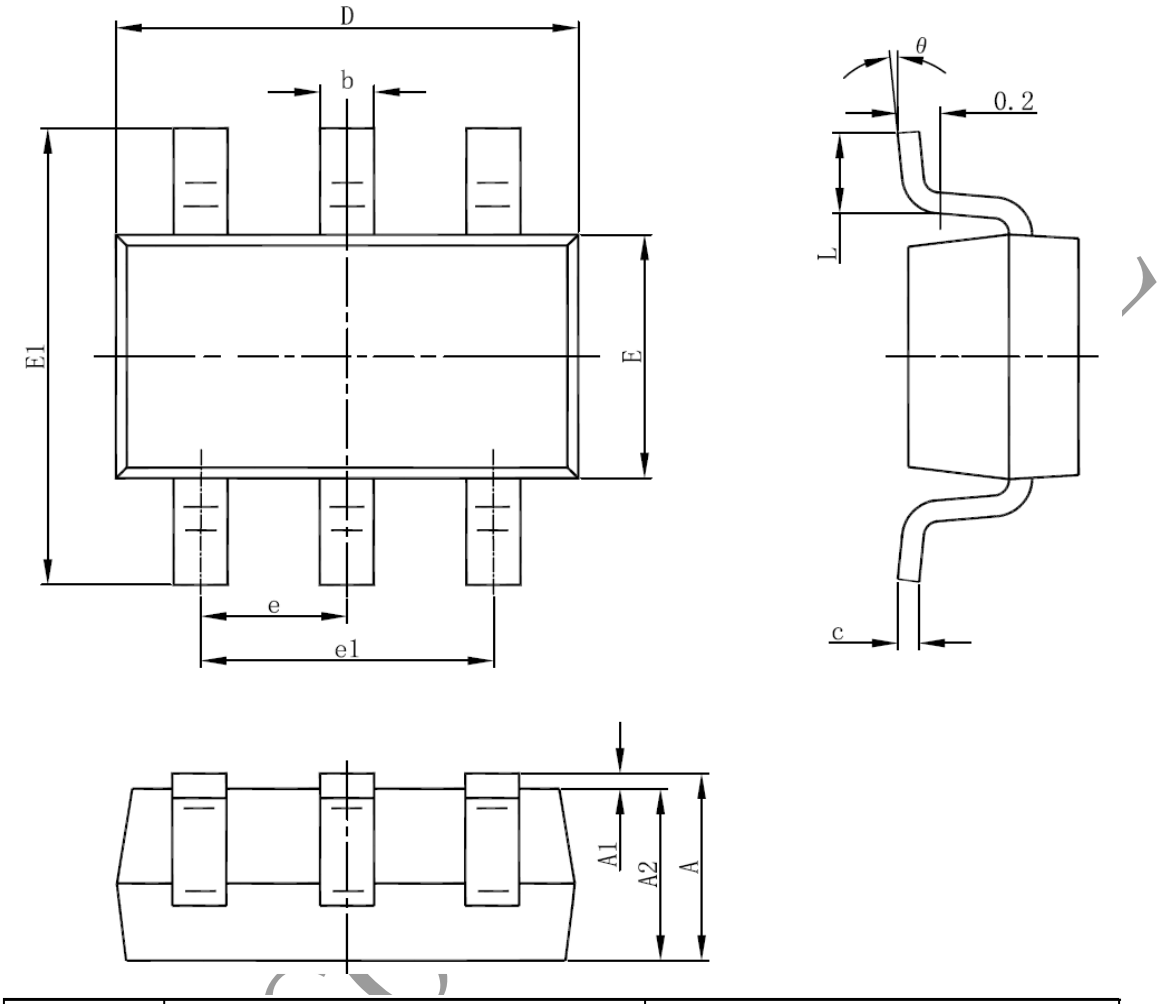


Figure 26. Normalized Maximum Transient Thermal Impedance

Physical Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°