

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	35mΩ@10V	5A
	45mΩ@4.5V	
-60V	68mΩ@-10V	-4A
	75mΩ@-4.5V	

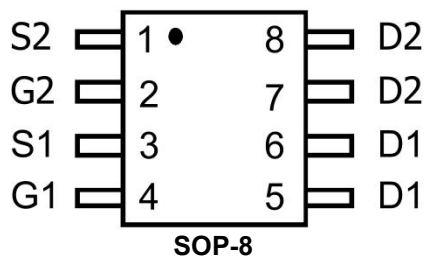
Feature

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

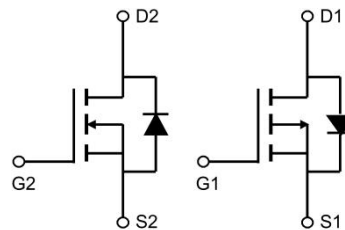
Application

- H-bridge
- Inverters

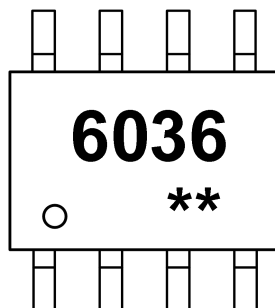
Package



Circuit diagram



Marking



6036 = Device code

** = Week Code

Absolute maximum ratings (Ta=25°C unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current	TC=25°C	I_D	5	-4	A
	TC=100°C		3.5	-2.8	
Pulsed Drain Current (Note 1)		I_{DM}	17	-14	A
Maximum Power Dissipation	TC=25°C	P_D	2	2	W
Thermal Resistance, Junction-to- Ambient (Note 2)		$R_{\theta JA}$	62.5		°C/W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 To 150	-55 To 150	°C

N-Channel Electrical characteristics (T_A=25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4.5A$	-	35	50	mΩ
		$V_{GS}=4.5V, I_D=4A$	-	45	65	
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=5A$	11	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, F=1.0MHz$	-	451	-	PF
Output Capacitance	C_{oss}		-	61	-	PF
Reverse Transfer Capacitance	C_{rss}		-	26	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, R_L=2.5\Omega, V_{GS}=10V, R_G=3\Omega$	-	4.4	-	nS
Turn-on Rise Time	t_r		-	3.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	16	-	nS
Turn-Off Fall Time	t_f		-	2	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=5A, V_{GS}=10V$	-	10	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	nC
Gate-Drain Charge	Q_{gd}		-	3.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=5A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	5	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ C, I_F = 5A$	-	28	-	nS
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s$ (Note 3)	-	32	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

P-Channel Electrical characteristics (TA=25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-3.5A$	-	68	85	m Ω
		$V_{GS}=-4.5V, I_D=-2.5A$	-	75	100	
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-4A$	11	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=-30V, V_{GS}=0V, F=1.0MHz$	-	960	-	PF
Output Capacitance	C_{oss}		-	87	-	PF
Reverse Transfer Capacitance	C_{rss}		-	38	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, R_L=2.5\Omega$ $V_{GS}=-10V, R_G=3\Omega$	-	9	-	nS
Turn-on Rise Time	t_r		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-4A, V_{GS}=10V$	-	15.7		nC
Gate-Source Charge	Q_{gs}		-	3		nC
Gate-Drain Charge	Q_{gd}		-	3.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-4A$	-		-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-4	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ C, I_F = -4A$ $di/dt = 100A/\mu s$ (Note3)	-	26.5	-	nS
Reverse Recovery Charge	Q_{rr}		-	31	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

N-Channel Typical Characteristics

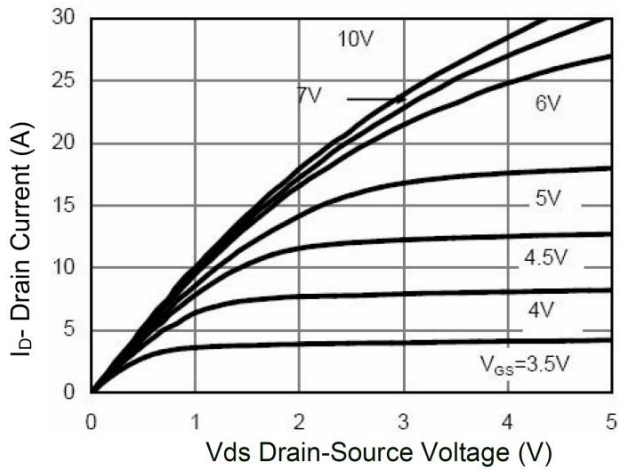


Figure 1 Output Characteristics

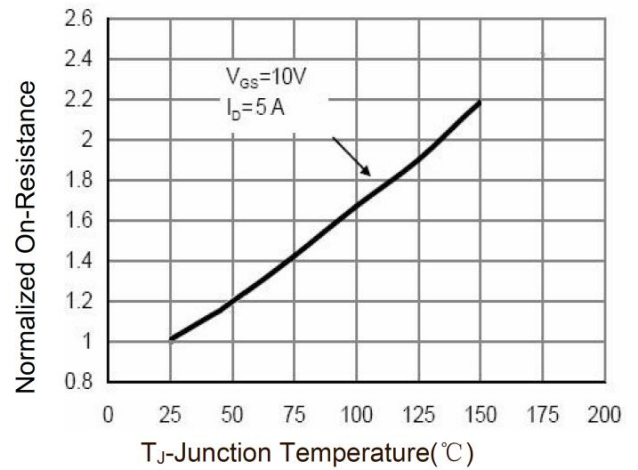


Figure 4 Rdson-Junction Temperature

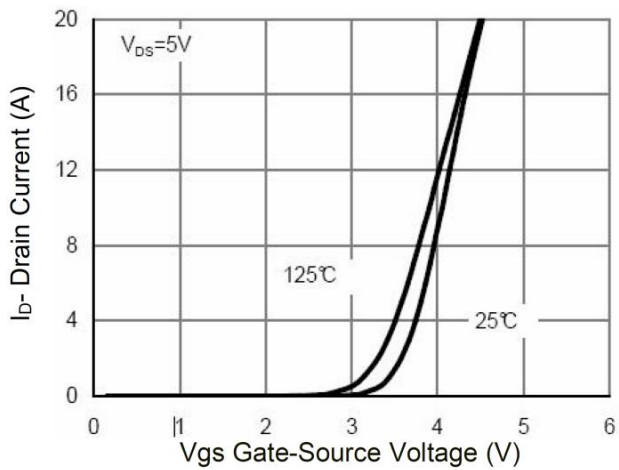


Figure 2 Transfer Characteristics

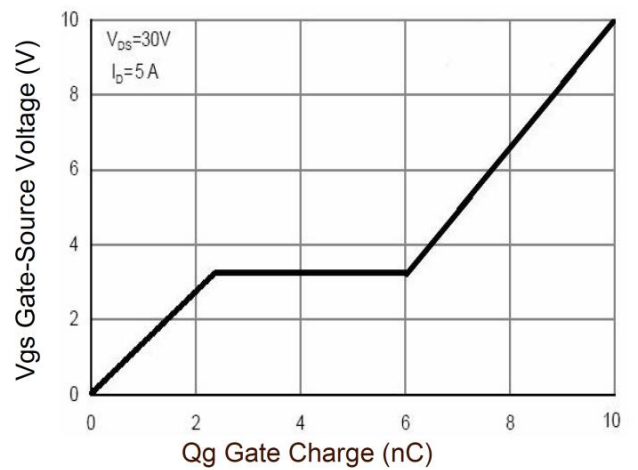


Figure 5 Gate Charge

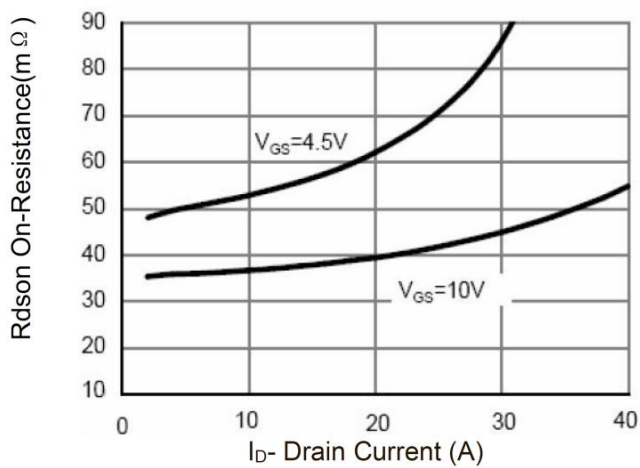


Figure 3 Rdson- Drain Current

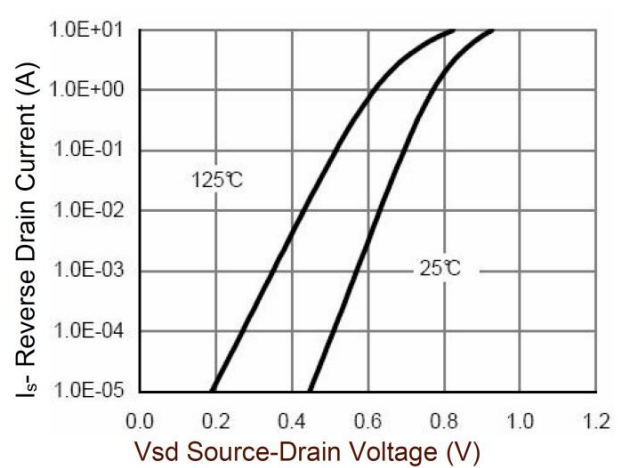


Figure 6 Source- Drain Diode Forward

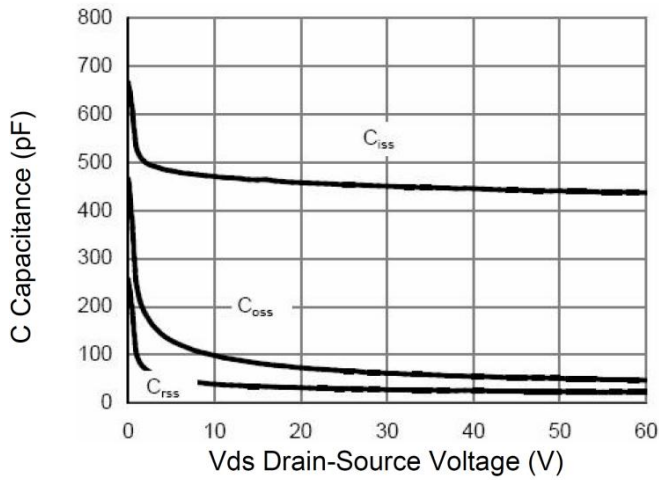


Figure 7 Capacitance vs Vds

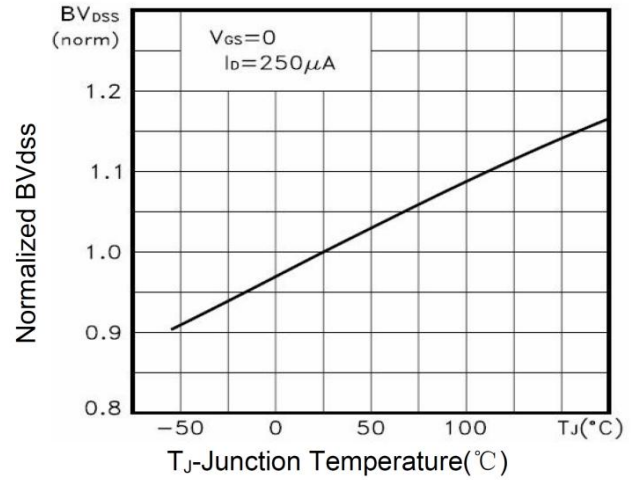


Figure 9 BV_{DSS} vs Junction Temperature

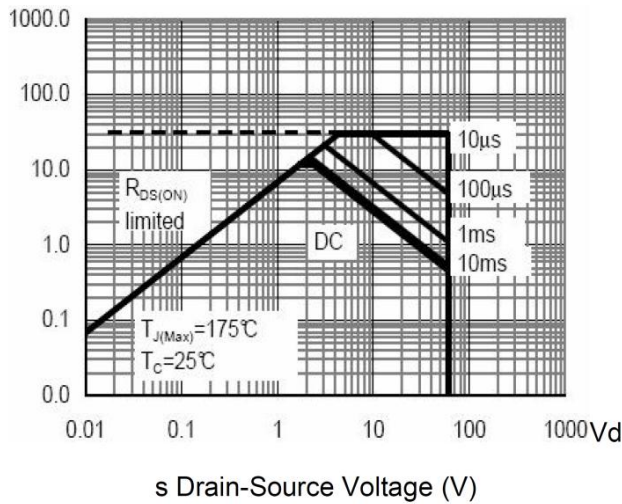


Figure 8 Safe Operation Area

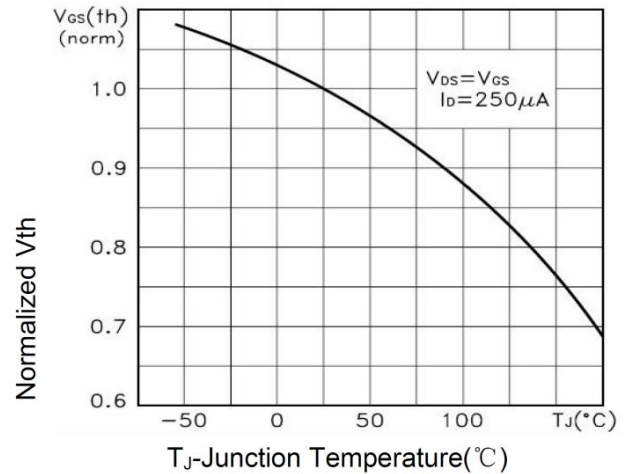


Figure 10 V_{GS(th)} vs Junction Temperature

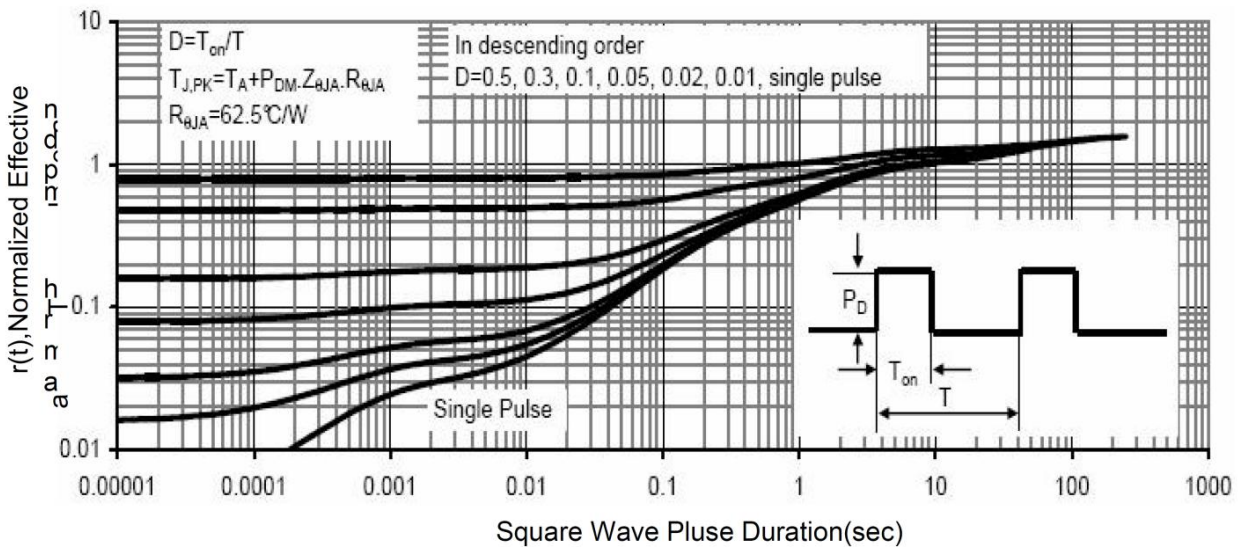


Figure 11 Normalized Maximum Transient Thermal Impedance

P-Channel Typical Characteristics

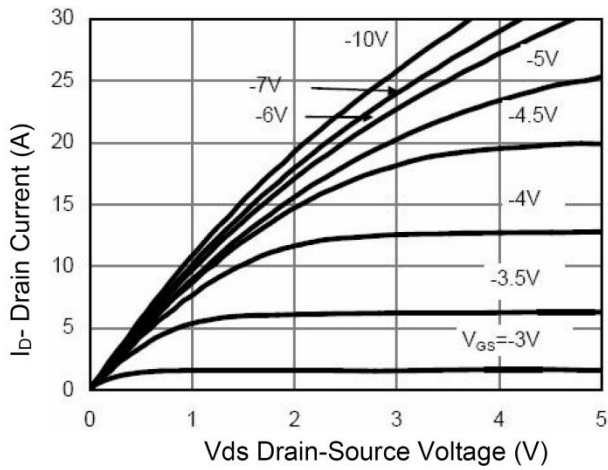


Figure 1 Output Characteristics

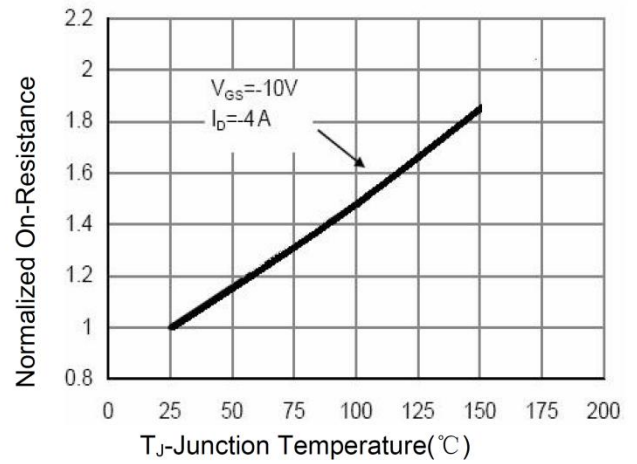


Figure 4 Rdson-Junction Temperature

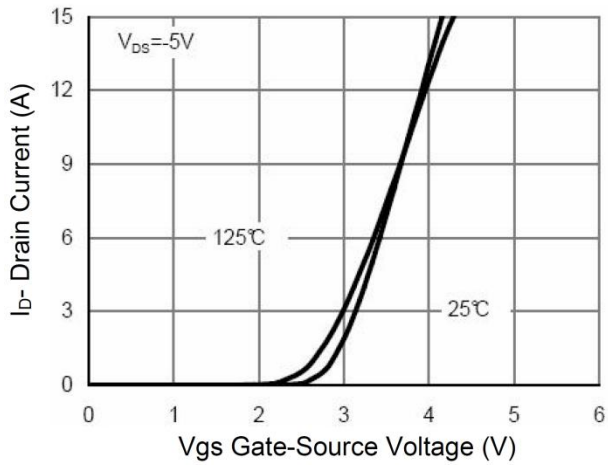


Figure 2 Transfer Characteristics

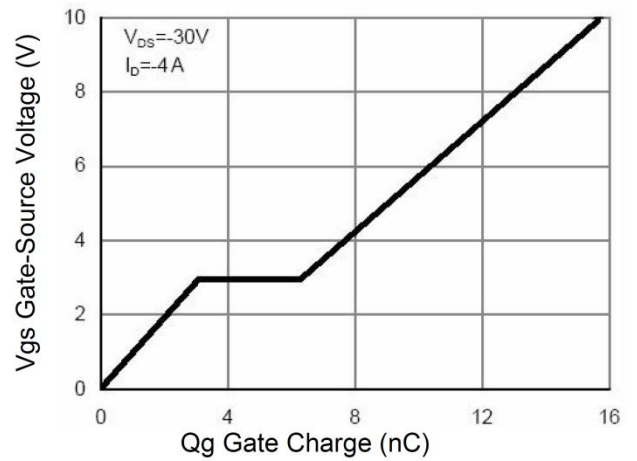


Figure 5 Gate Charge

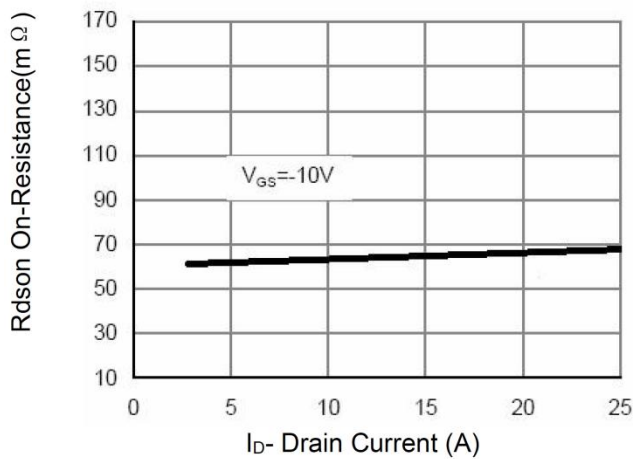


Figure 3 Rdson- Drain Current

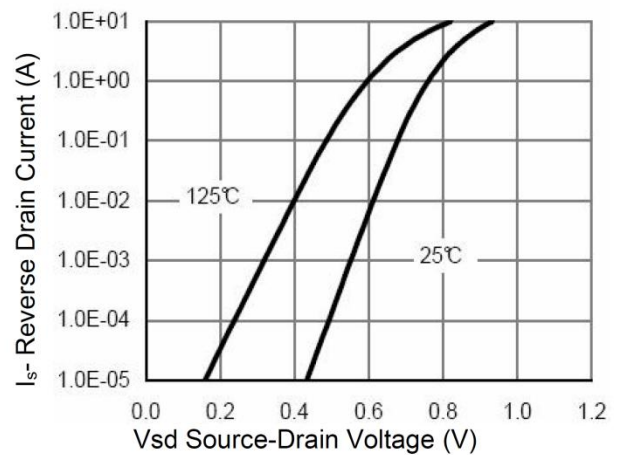


Figure 6 Source- Drain Diode Forward

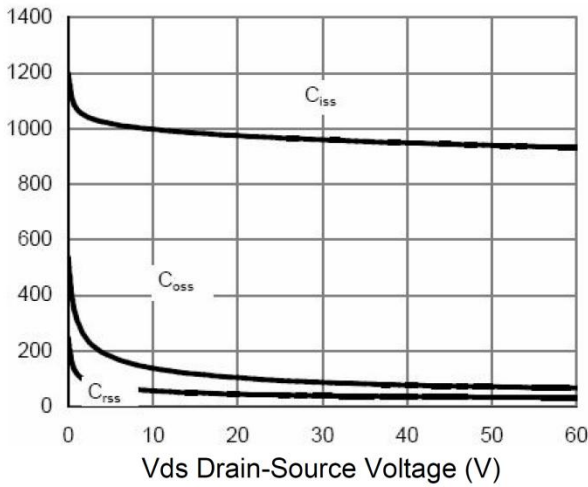


Figure 7 Capacitance vs Vds

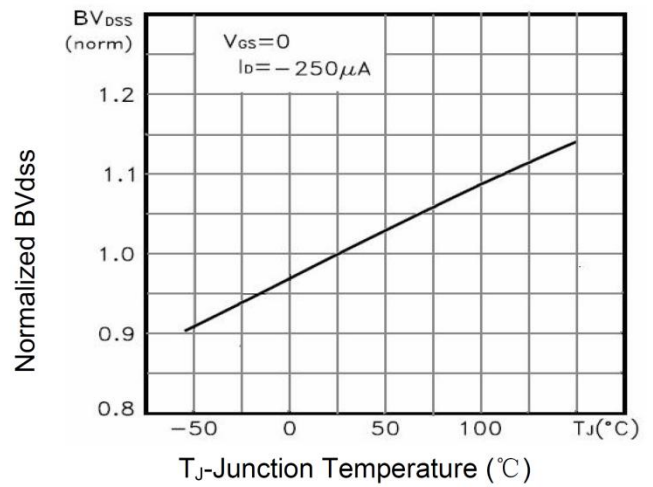


Figure 9 BV_{DSS} vs Junction Temperature

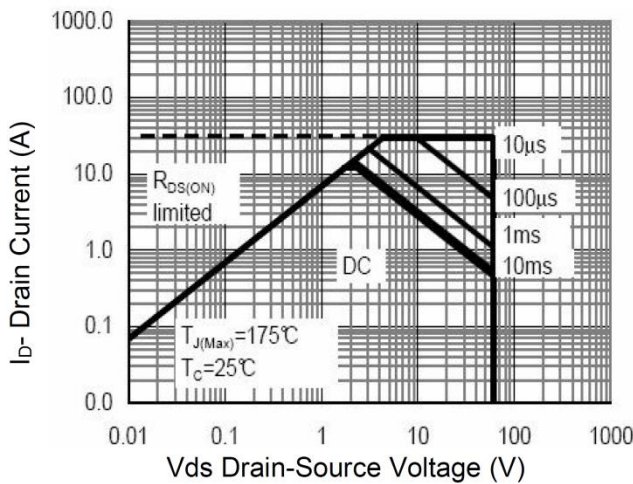


Figure 8 Safe Operation Area

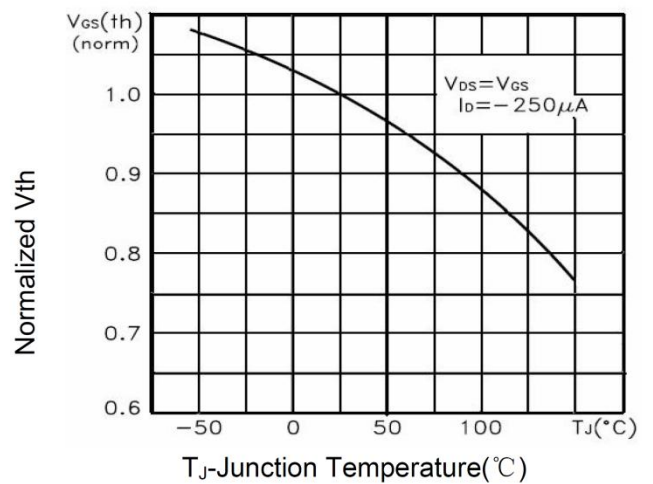


Figure 10 V_{GS(th)} vs Junction Temperature

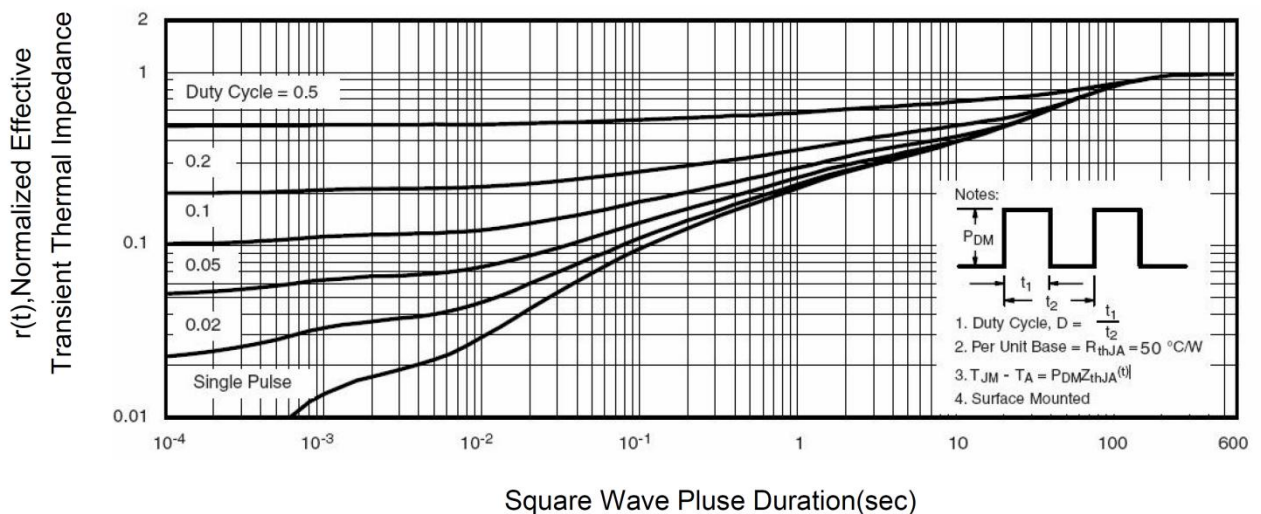
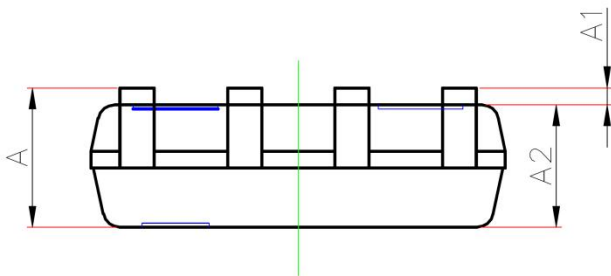
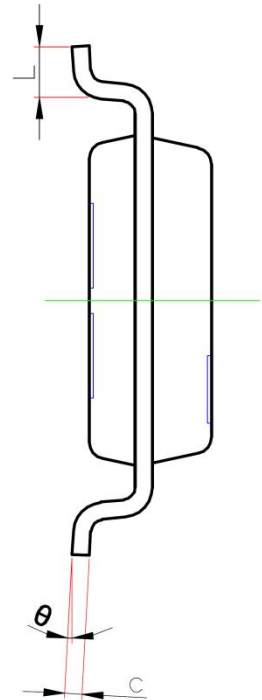
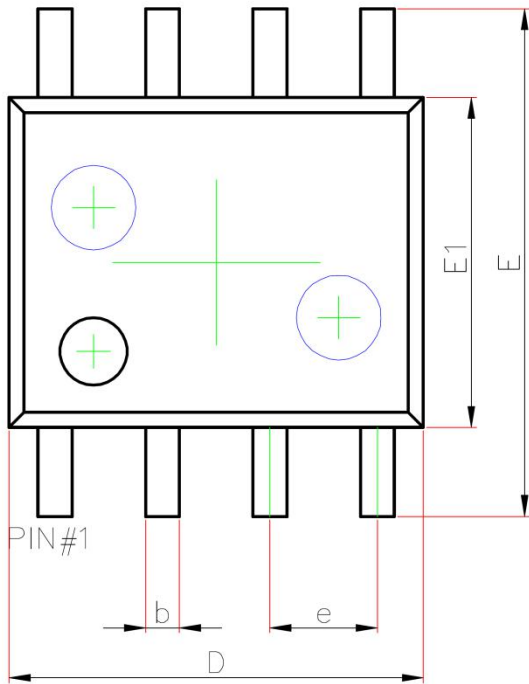


Figure 11 Normalized Maximum Transient Thermal Impedance



SOP-8 Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
A2	1.35	1.55
b	0.33	0.51
c	0.17	0.25
D	4.80	5.00
e	1.27 REF.	
E	5.80	6.20
E1	3.80	4.00
L	0.40	1.27
θ	0°	8°

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