

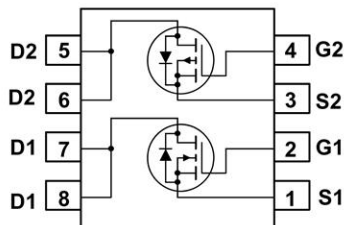
General Features

- **N-Channel**
 $V_{DS} = 60V, I_D = 6.0A$
 $R_{DS(ON)} < 35m\Omega @ V_{GS}=10V$
- **P-Channel**
 $V_{DS} = -60V, I_D = -5A$
 $R_{DS(ON)} < 95m\Omega @ V_{GS}=-10V$

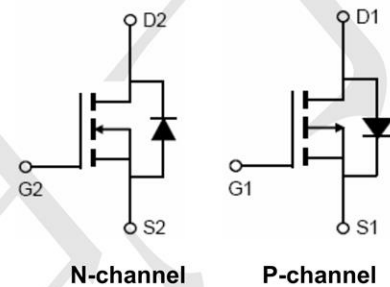
Application

- High power and current handing capability
- Lead free product is acquired
- Surface mount package

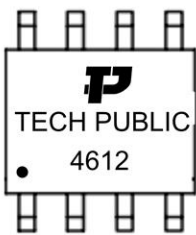
Package and Pin Configuration



Circuit diagram



Marking



Absolute Maximum Ratings ($T_A=25^\circ C$ 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	I_D	$T_A=25^\circ C$	6.0	-5	A
		$T_A=100^\circ C$	4.5	-4.2	
Pulsed Drain Current (Note 1)	I_{DM}	40	-25	A	
Maximum Power Dissipation	P_D	2.0	2.0	W	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	$^\circ C$	

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note2)	$R_{\theta JA}$	N-Ch	62.5	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient (Note2)	$R_{\theta JA}$	P-Ch	62.5	$^\circ C/W$

N-CH 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 =250μA	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} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	-	3.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6A	-	30	35	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =6A	15	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{ISS}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	500	-	PF
Output Capacitance	C _{OSS}		-	60	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	25	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, R _L =4.7Ω V _{GS} =10V, R _{GEN} =3Ω	-	5	-	nS
Turn-on Rise Time	t _r		-	2.6	-	nS
Turn-Off Delay Time	t _{d(off)}		-	16.1	-	nS
Turn-Off Fall Time	t _f		-	2.3	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =6A, V _{GS} =10V	-	25	-	nC
Gate-Source Charge	Q _{gs}		-	4.5	-	nC
Gate-Drain Charge	Q _{gd}		-	6.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =6A	-	0.8	1.2	V

P-CH 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 =-250μA	-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} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-	-3.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-5A	-	88	95	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-15V, I _D =-5A	16	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	1450	-	PF
Output Capacitance	C _{oss}		-	145	-	PF
Reverse Transfer Capacitance	C _{rss}		-	110	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, R _L =30Ω V _{GS} =-10V, R _{GEN} =6Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	9	-	nS
Turn-Off Delay Time	t _{d(off)}		-	65	-	nS
Turn-Off Fall Time	t _f	V _{DS} =-30V, I _D =-5A, V _{GS} =-10V	-	30	-	nS
Total Gate Charge	Q _g		-	26	-	nC
Gate-Source Charge	Q _{gs}		-	4.5	-	nC
Gate-Drain Charge	Q _{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-6	A



N-CH Typical Electrical and Thermal Characteristics (Curves)

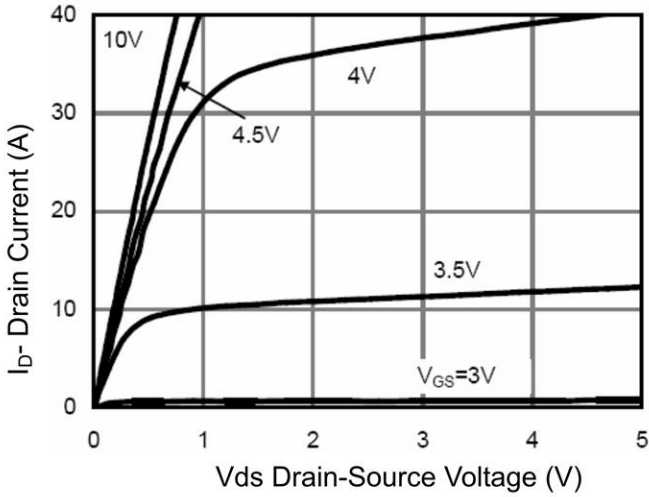


Figure 1 Output Characteristics

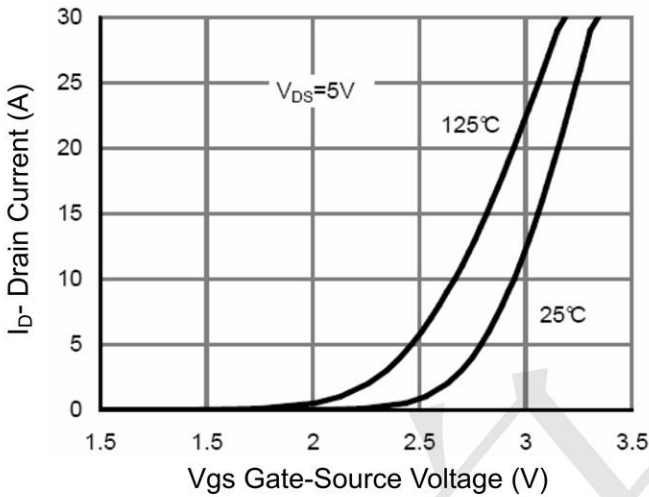


Figure 2 Transfer Characteristics

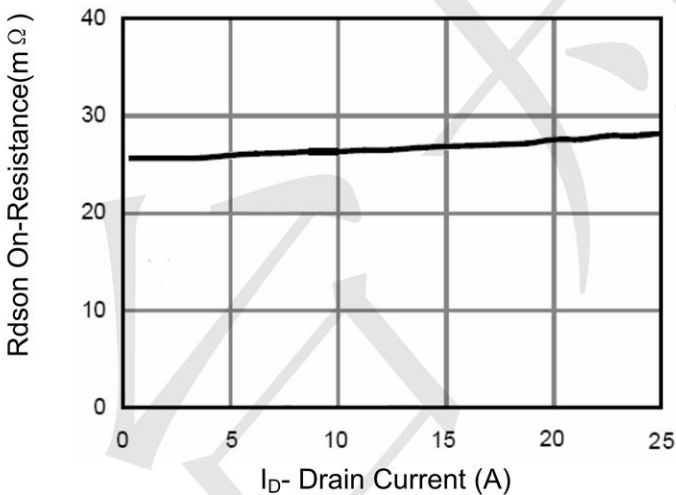


Figure 3 Rdson- Drain Current

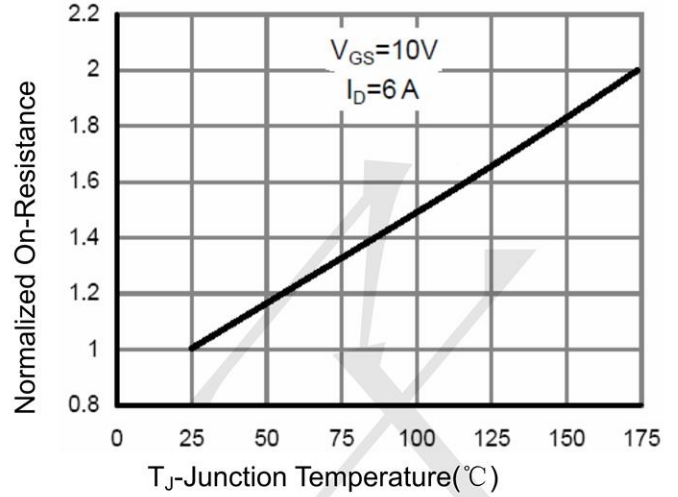


Figure 4 Rdson-Junction Temperature

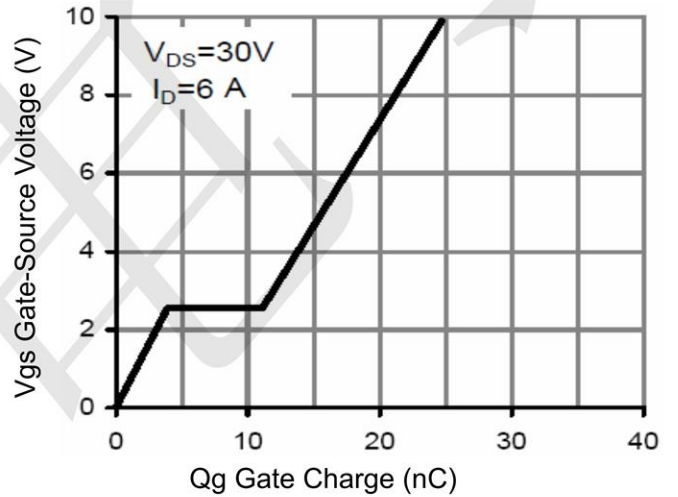


Figure 5 Gate Charge

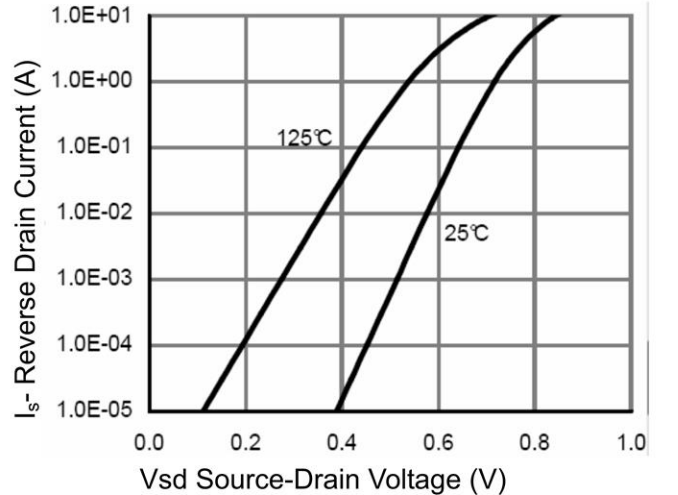


Figure 6 Source- Drain Diode Forward

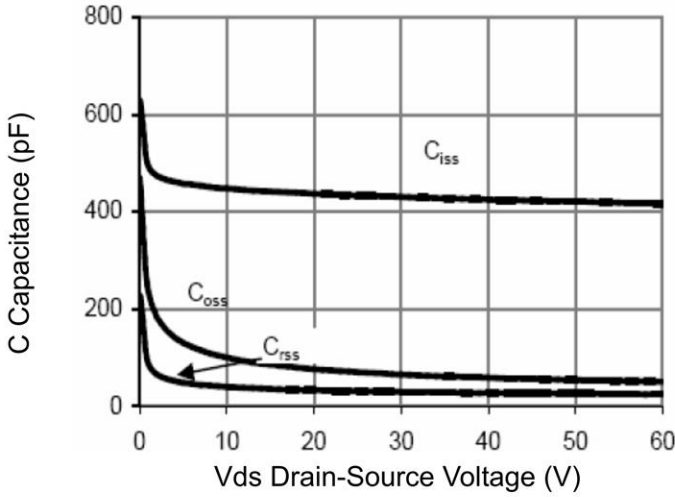


Figure 7 Capacitance vs Vds

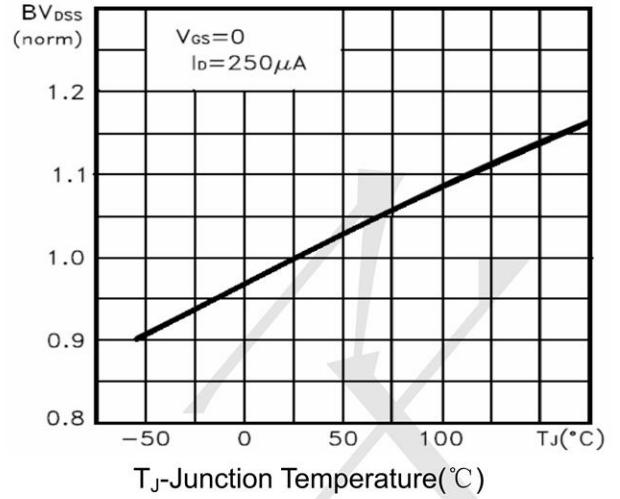


Figure 9 BV_{DSS} vs Junction Temperature

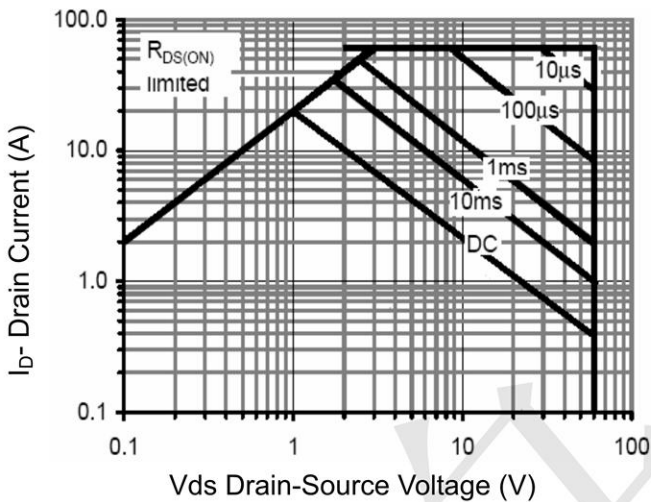


Figure 8 Safe Operation Area

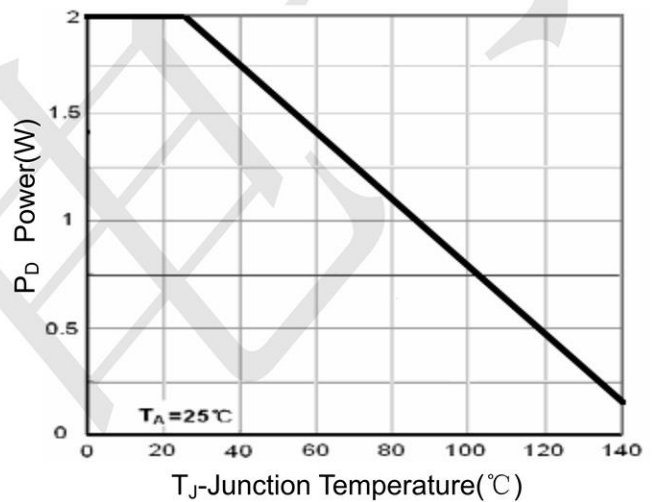


Figure 10 Power Dissipation

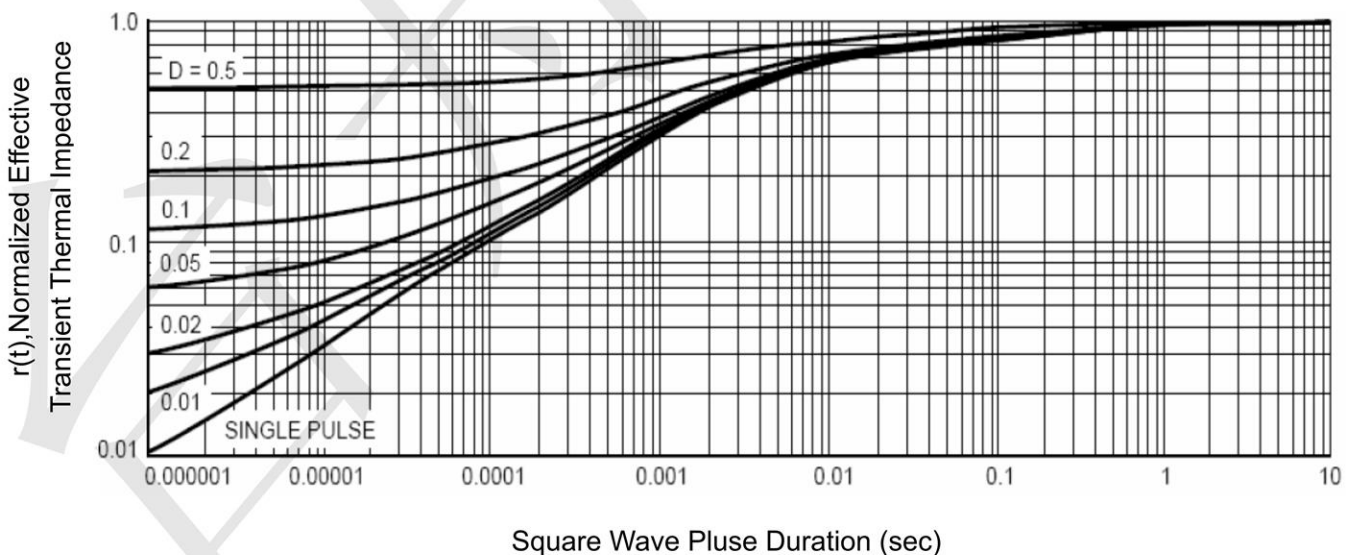


Figure 11 Normalized Maximum Transient Thermal Impedance



P-CH Typical Electrical and Thermal Characteristics (Curves)

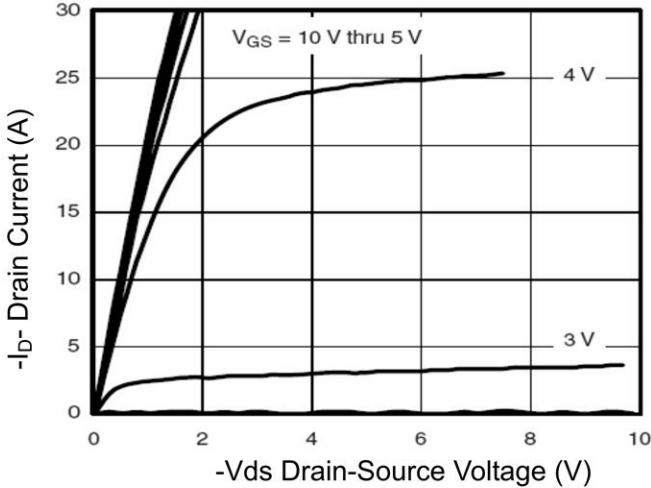


Figure 1 Output Characteristics

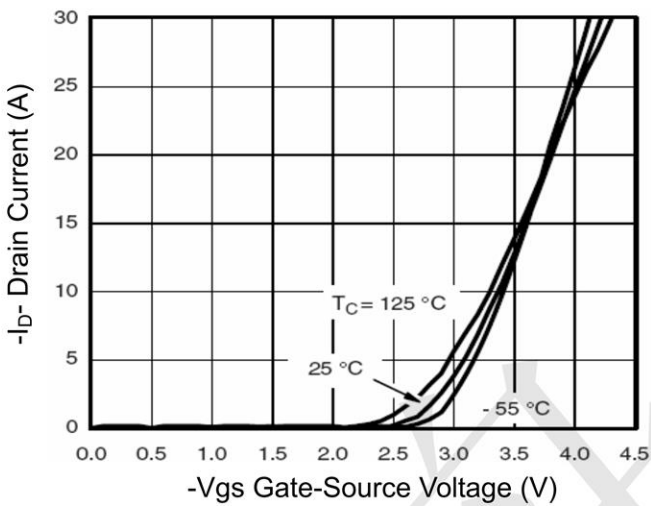


Figure 2 Transfer Characteristics

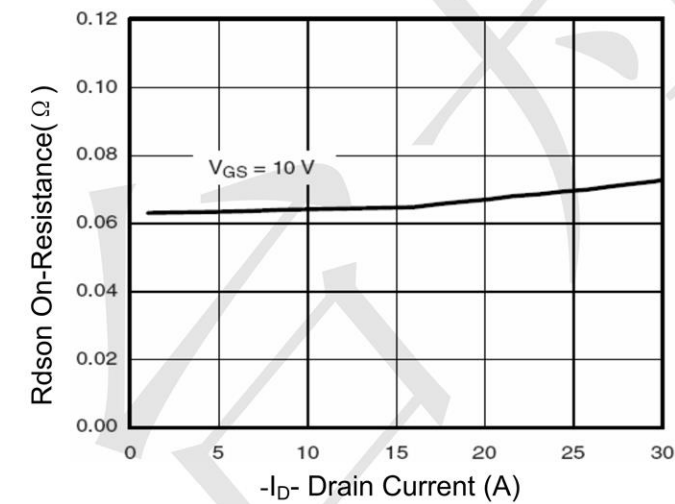


Figure 3 $R_{DS(on)}$ - Drain Current

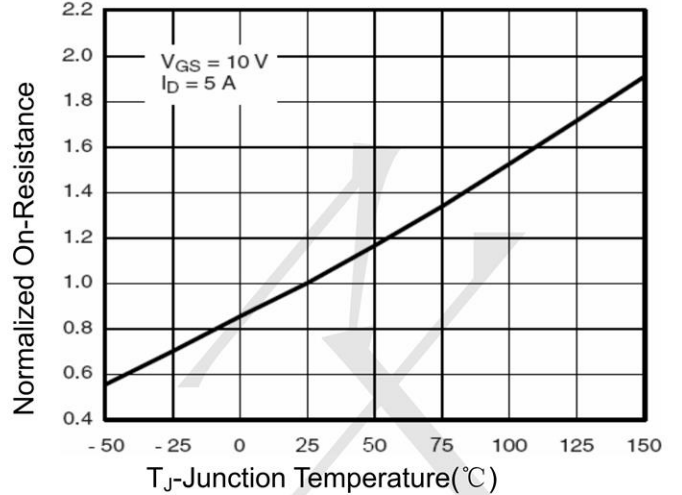


Figure 4 $R_{DS(on)}$ -Junction Temperature

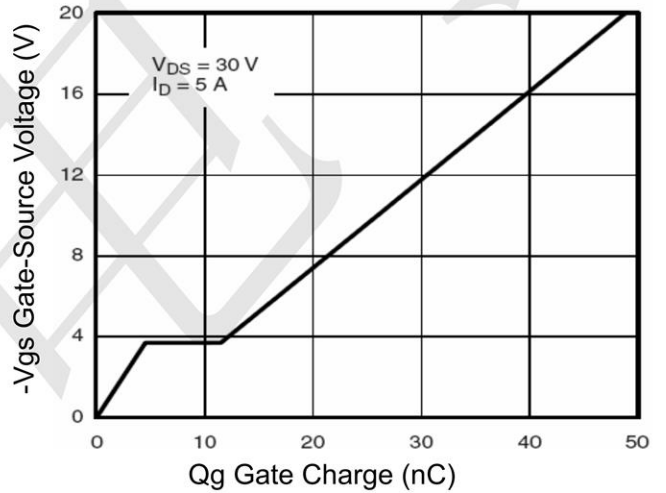


Figure 5 Gate Charge

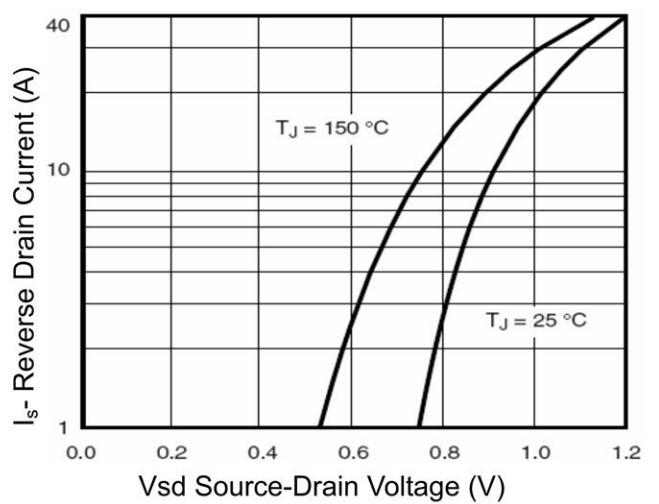


Figure 6 Source- Drain Diode Forward

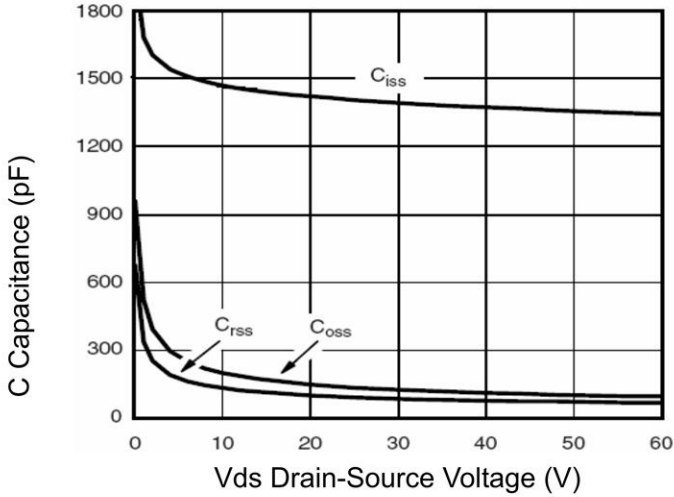


Figure 7 Capacitance vs Vds

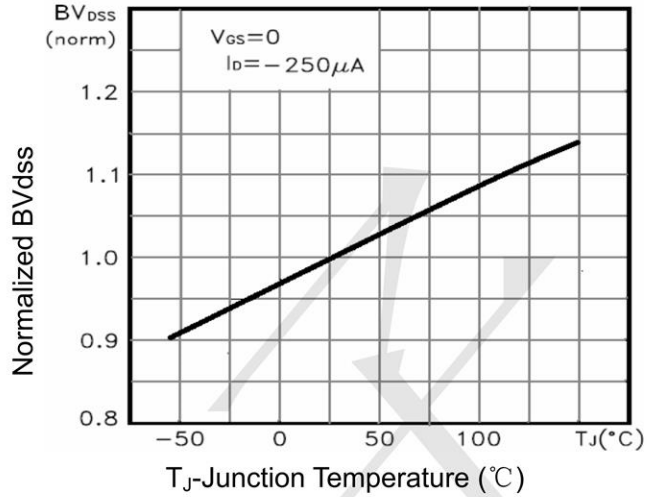


Figure 9 BV_{DSS} vs Junction Temperature

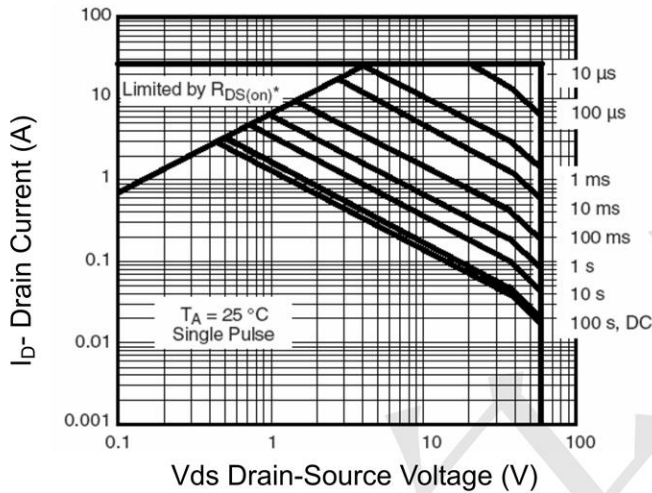


Figure 8 Safe Operation Area

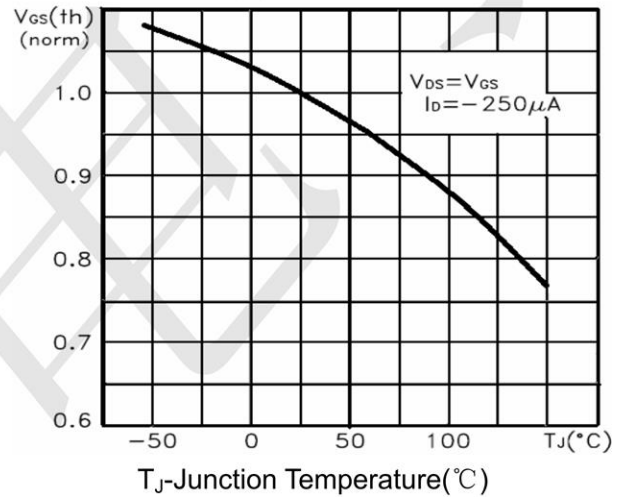


Figure 10 V_{GS(th)} vs Junction Temperature

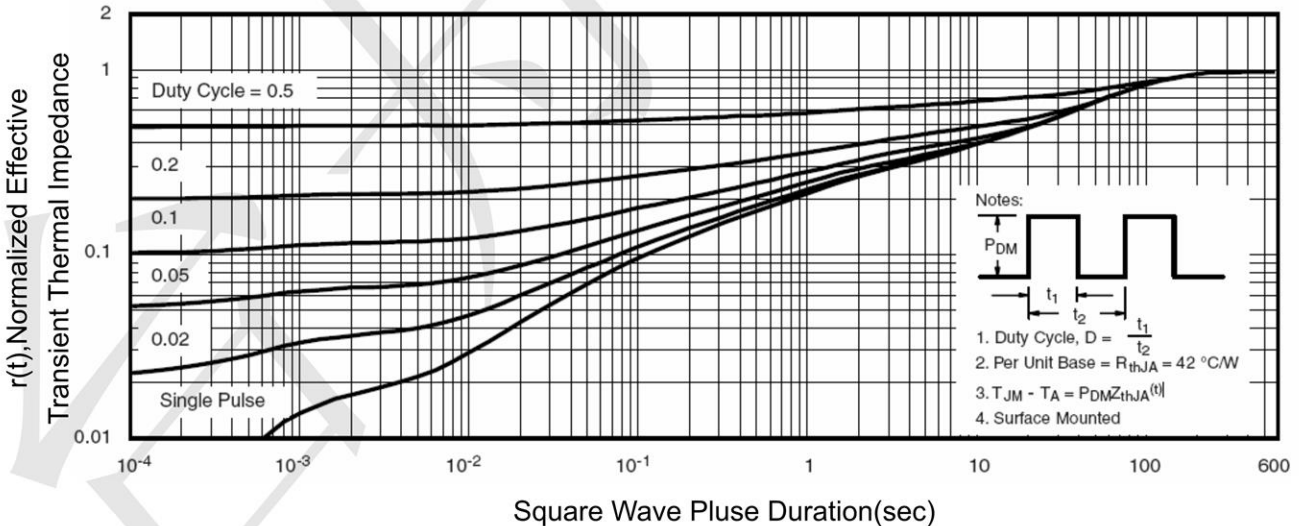
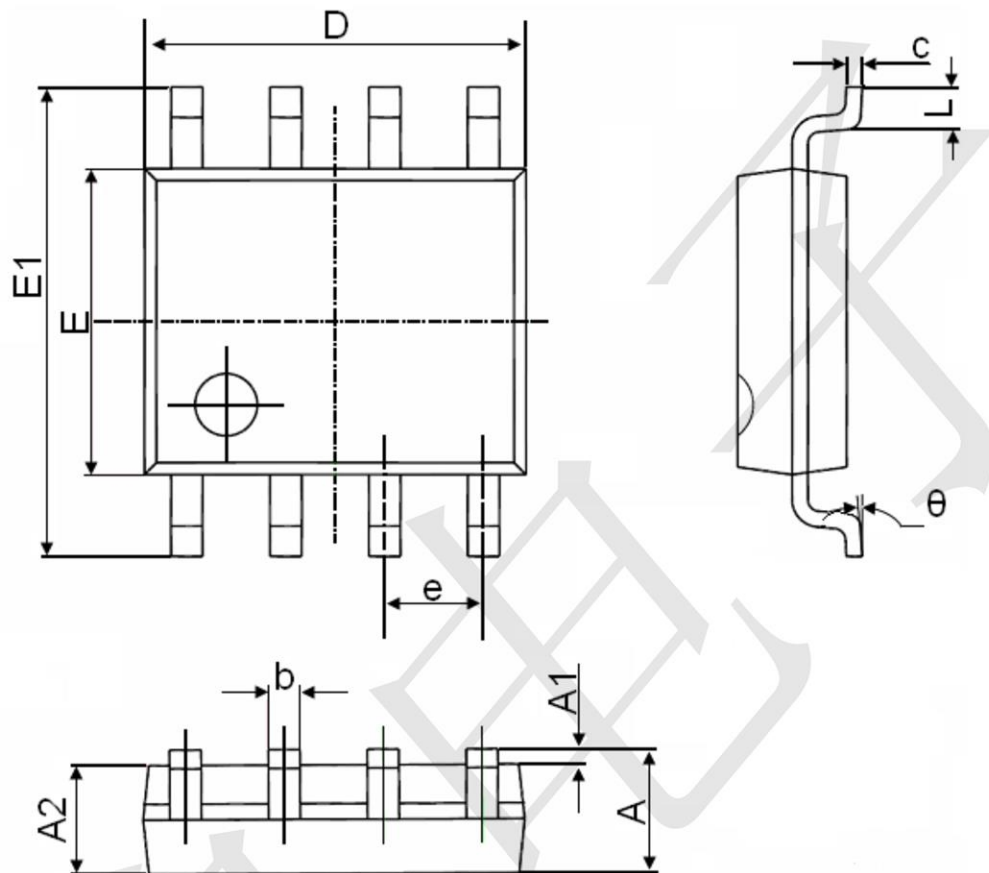


Figure 11 Normalized Maximum Transient Thermal Impedance



SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°