

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	15mΩ@10V	10A	-60V	38mΩ@-10V	-10A
	18mΩ@4.5V			48mΩ@-4.5V	

Feature

- Trench Power MOSFET
- Excellent $R_{DS(on)}$ and Low Gate Charge
- Fast Switching Speed

Application

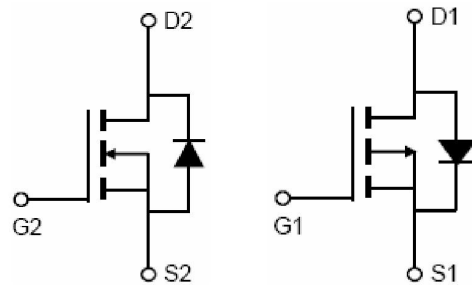
- Motor Control
- DC/DC Converters
- Power Management

Package

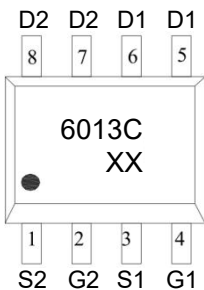


SOP-8

Circuit diagram



Marking



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	I_D	10	-10	A
Power Dissipation	P_D	1.5	3.6	W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	83	34	$^{\circ}C/W$
Junction Temperature	T_J	150	150	$^{\circ}C$
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	$^{\circ}C$

N-CH Electrical characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=48V, V_{GS}=0V$			1	μA
Gate-body leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.7	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$		11	15	m Ω
		$V_{GS}=4.5V, I_D=1A$		13	18	m Ω
Dynamic characteristics¹⁾						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		3240		pF
Output Capacitance	C_{oss}			210		
Reverse Transfer Capacitance	C_{rss}			146		
Total Gate Charge	Q_g	$V_{DS}=48V, V_{GS}=4.5V, I_D=10A$		32		nC
Gate-Source Charge	Q_{gs}			11		
Gate-Drain Charge	Q_{gd}			9.5		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30V, V_{GS}=10V$ $R_G=3.3\Omega, I_D=10A$		10.8		nS
Turn-on rise time	t_r			9.5		
Turn-off delay time	$t_{d(off)}$			66		
Turn-off fall time	t_f			5		
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}C$			1.2	V

P-CH Electrical characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -48V, V _{GS} = 0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.7	-2.5	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -2A		30	38	mΩ
		V _{GS} = -4.5V, I _D = -1A		36	48	mΩ
Dynamic characteristics¹⁾						
Input Capacitance	C _{iss}	V _{DS} = -30V, V _{GS} = 0V, f = 1MHz		2417		pF
Output Capacitance	C _{oss}			179		
Reverse Transfer Capacitance	C _{rss}			120		
Total Gate Charge	Q _g	V _{DS} = -30V, V _{GS} = -10V, I _D = -6.2A		46.5		nC
Gate-Source Charge	Q _{gs}			9.1		
Gate-Drain Charge	Q _{gd}			9.2		
Turn-on delay time	t _{d(on)}	V _{DD} = -30V, V _{GEN} = -10V, R _L = 4.7Ω, R _{GEN} = 3Ω		9.8		nS
Turn-on rise time	t _r			6.1		
Turn-off delay time	t _{d(off)}			44		
Turn-off fall time	t _f			12.7		
Source-Drain Diode characteristics						
Diode Forward voltage	V _{SD}	V _{GS} = 0V, I _S = -1A			-1.2	V

Notes:

1) Guaranteed by design, not subject to production.

N- Channel Typical Characteristics

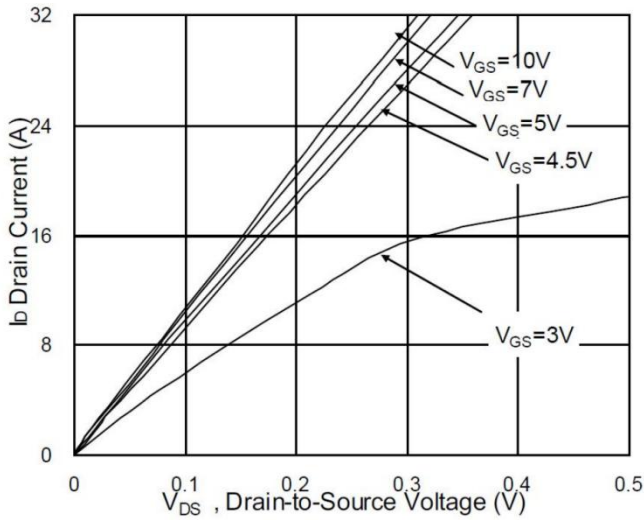


Fig.1 Typical Output Characteristics

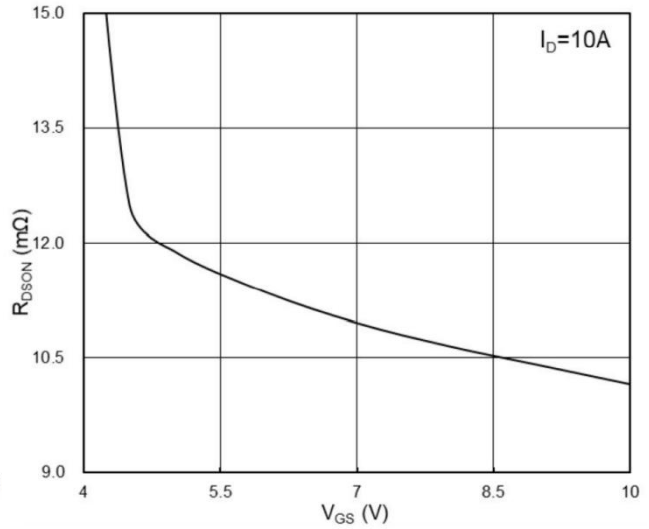


Fig.2 On-Resistance vs G-S Voltage

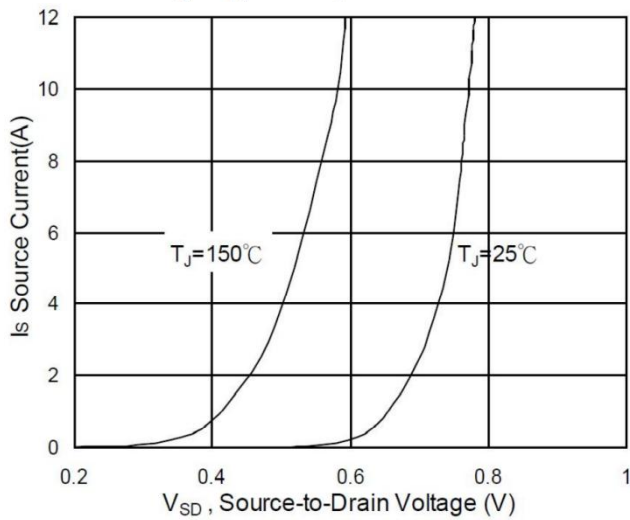


Fig.3 Source Drain Forward Characteristics

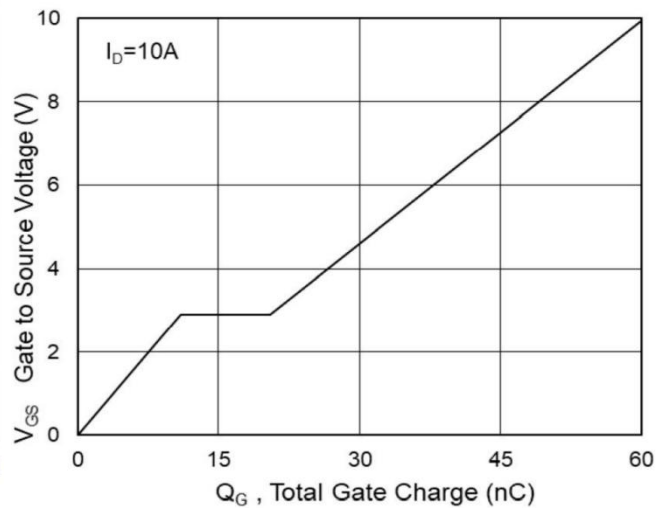


Fig.4 Gate-Charge Characteristics

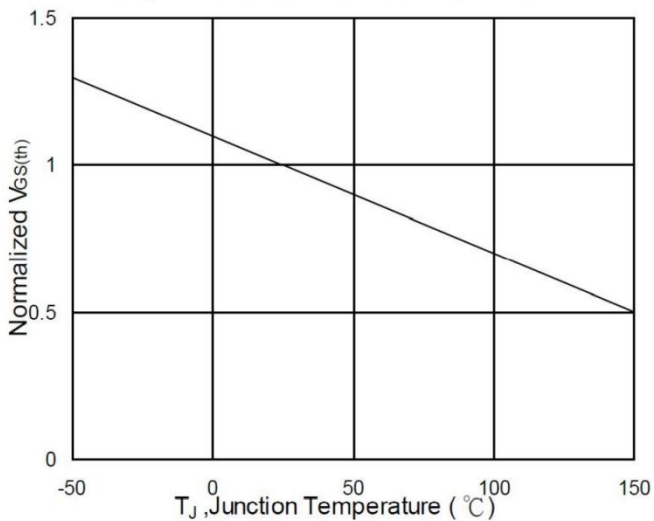


Fig.5 Normalized VGS(th) vs TJ

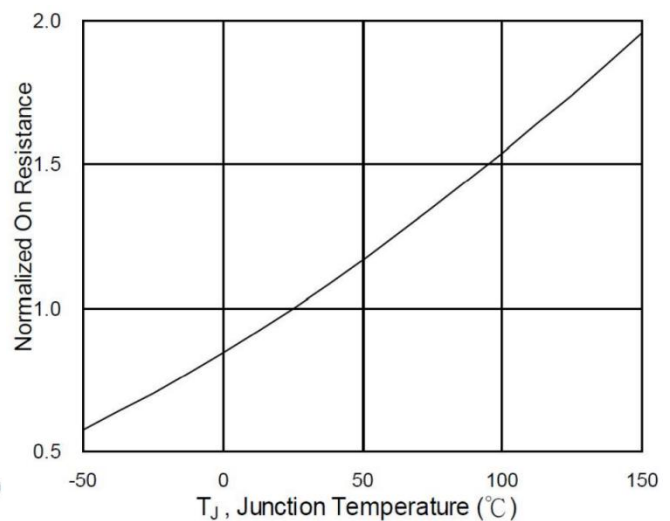


Fig.6 Normalized RDS(on) vs TJ

N- Channel Typical Characteristics

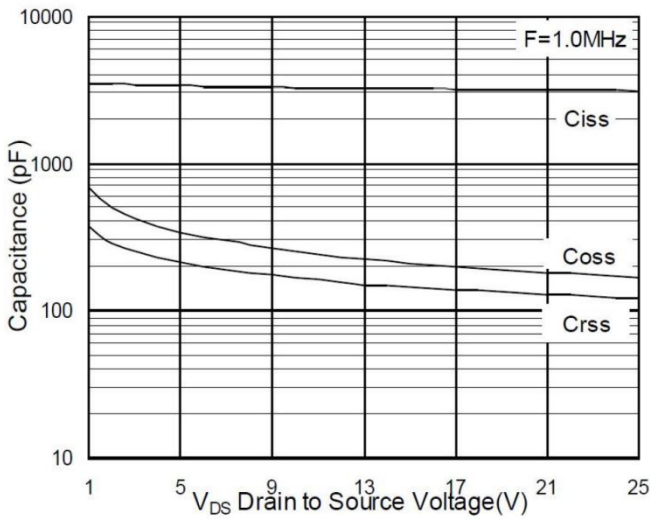


Fig.7 Capacitance

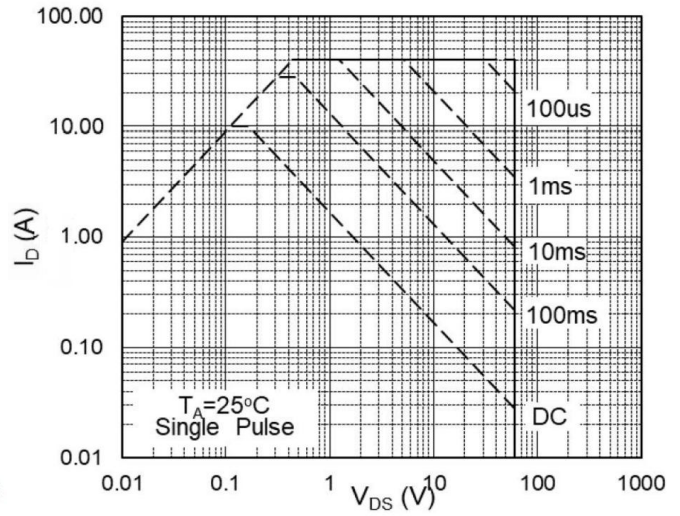


Fig.8 Safe Operating Area

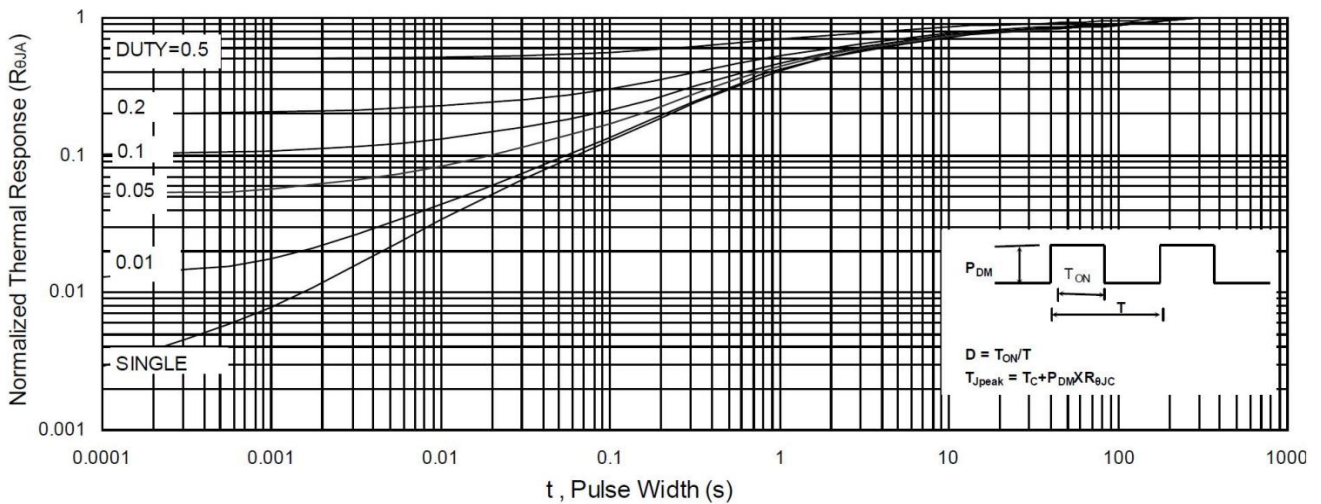


Fig.9 Normalized Maximum Transient Thermal Impedance

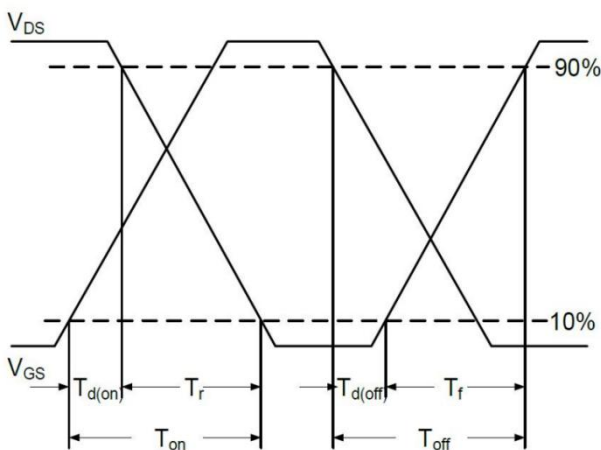


Fig.10 Switching Time Waveform

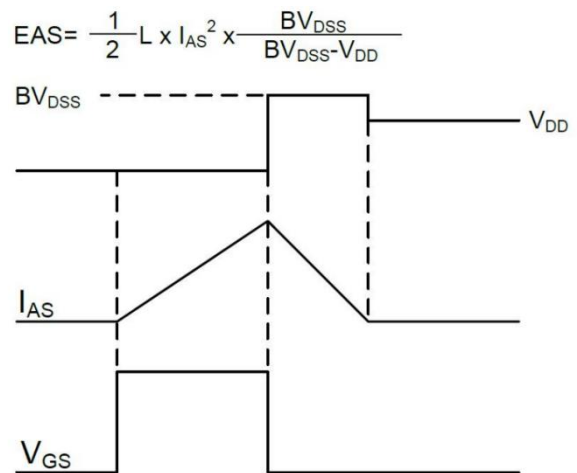


Fig.11 Unclamped Inductive Switching Waveform

P- Channel Typical Characteristics

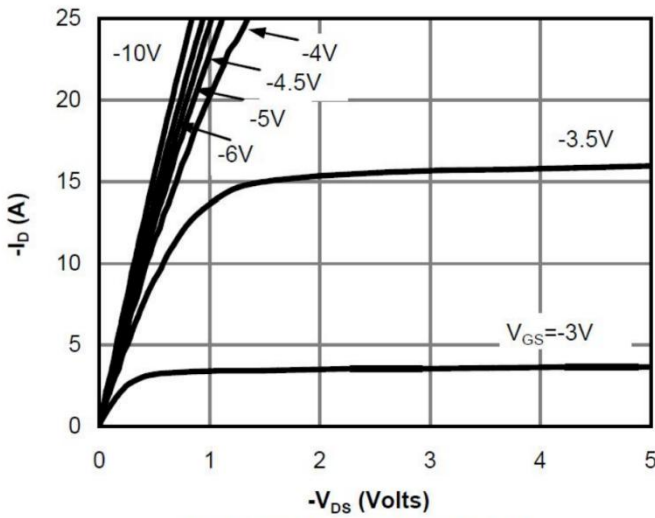


Fig 1: On-Region Characteristics

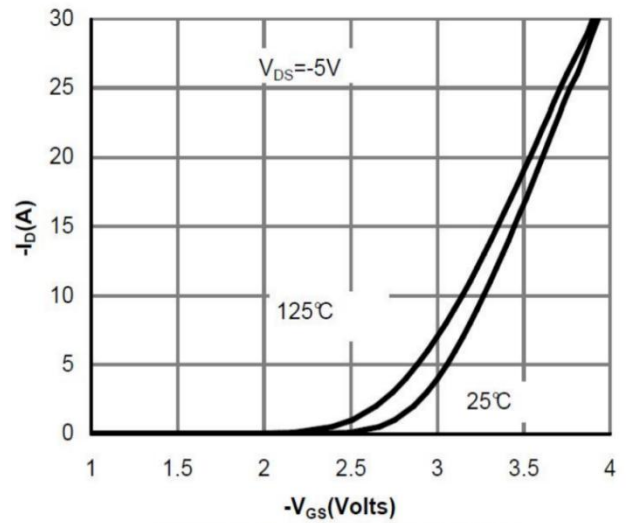


Figure 2: Transfer Characteristics

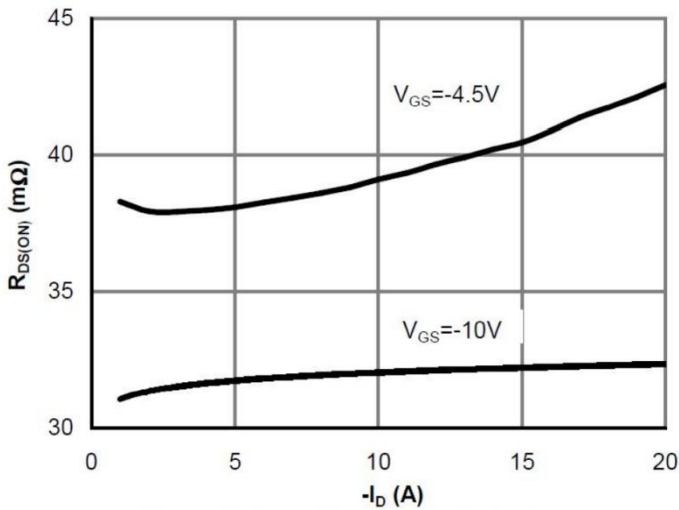


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

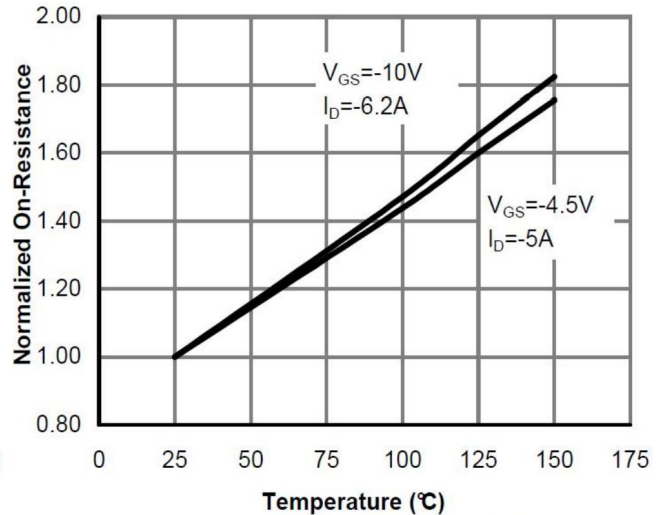


Figure 4: On-Resistance vs. Junction Temperature

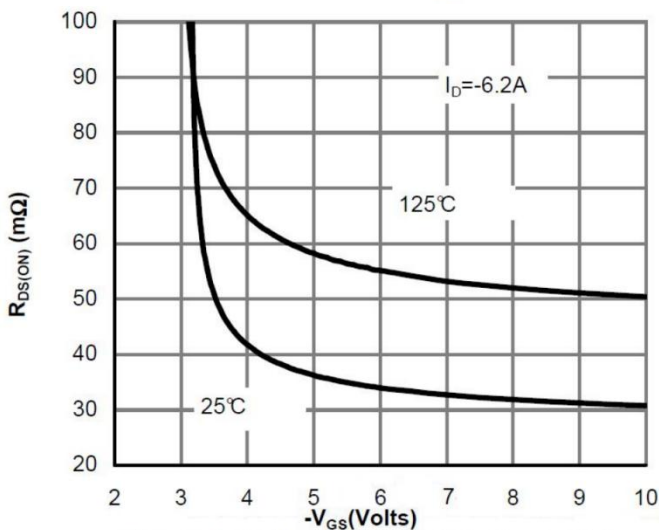


Figure 5: On-Resistance vs. Gate-Source Voltage

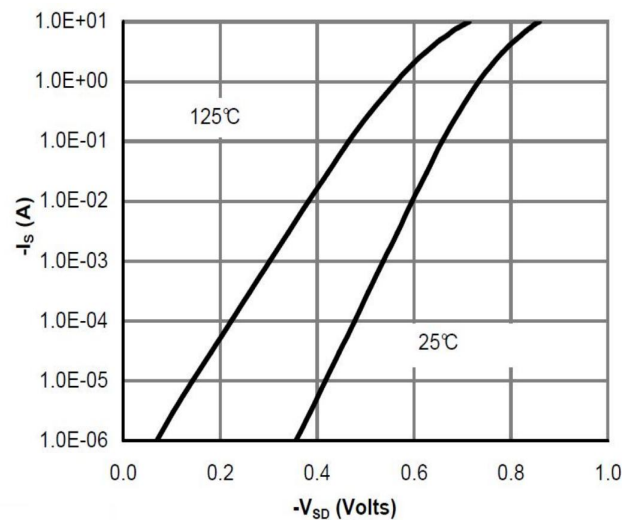


Figure 6: Body-Diode Characteristics

P- Channel Typical Characteristics

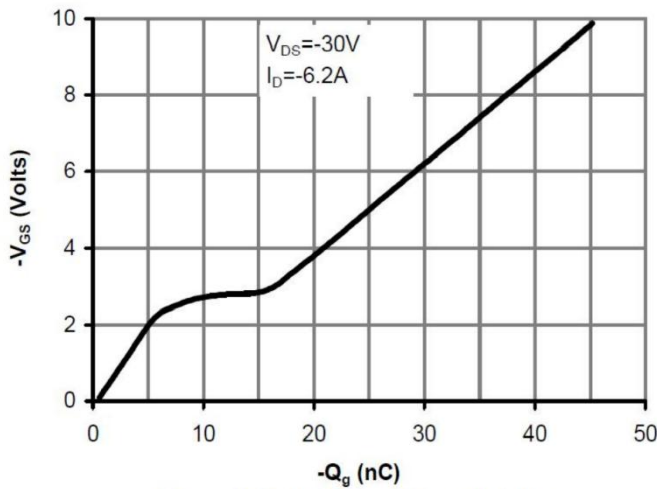


Figure 7: Gate-Charge Characteristics

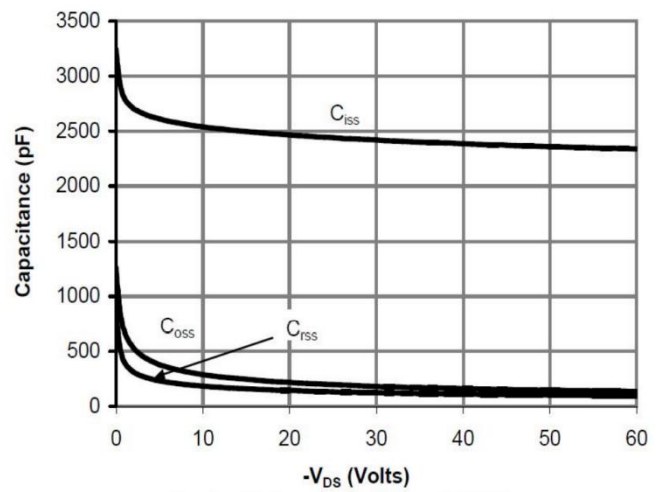


Figure 8: Capacitance Characteristics

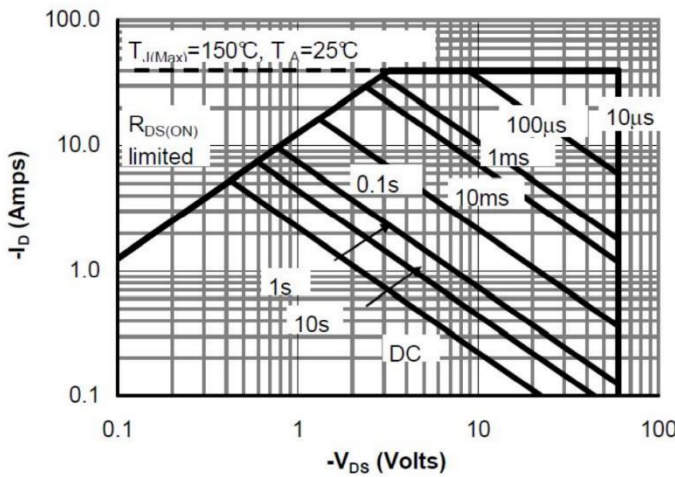


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

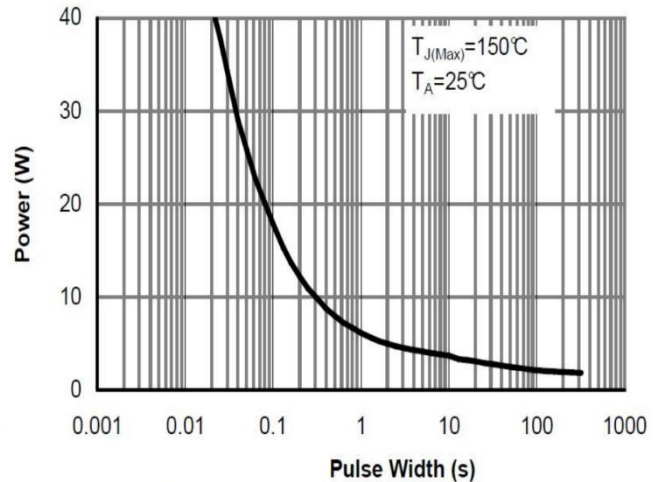


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

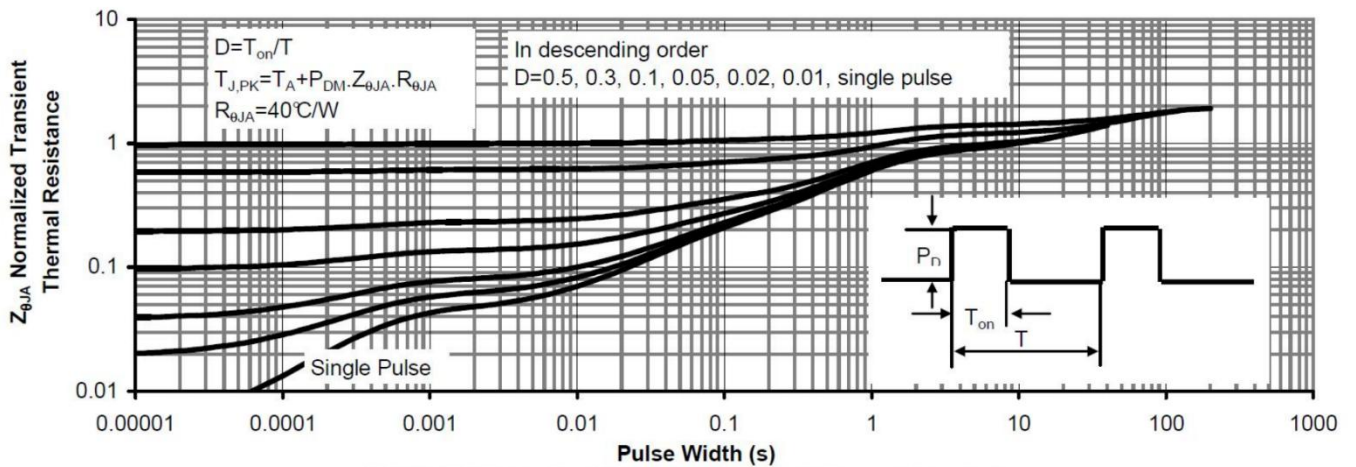
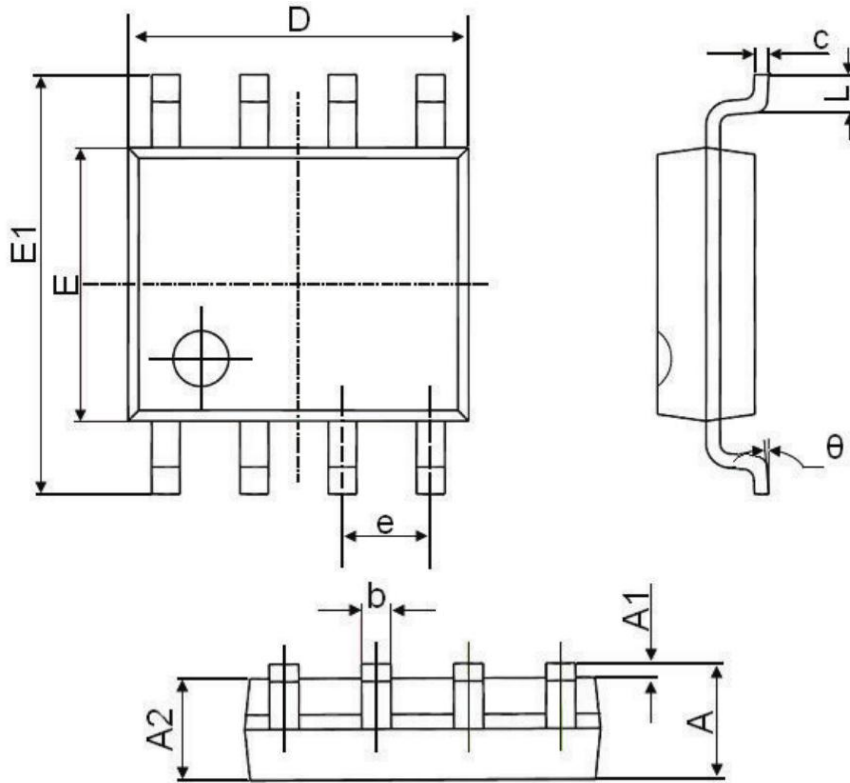


Figure 11: Normalized Maximum Transient Thermal Impedance

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	1.250	1.650	0.049	0.065
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(REF)		0.050(REF)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°