Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

Applications

- Power management in half bridge and inverters
- DC-DC Converter
- Load Switch

General Description

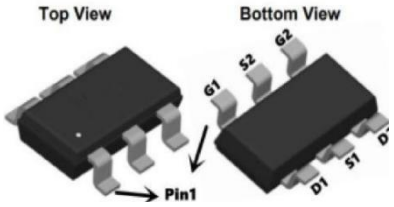
The XR4G03L is the highest performance trench N-ch and P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

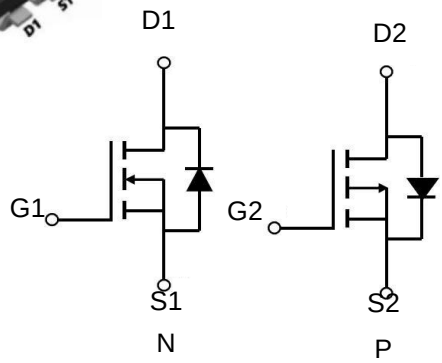
The XR4G03L meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Product Summary

BVDSS	RDSON	ID
30V	29mΩ	4A
-30V	53mΩ	-4A

SOT 23-6L Pin Configurations





Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	4	-4.0	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	2	-2.5	A
I_{DM}	Pulsed Drain Current[2]	20	-22	A
EAS	Single Pulse Avalanche Energy[3]	72	79	mJ
I_{AS}	Avalanche Current	21	-21	A
P_D@T_C=25℃	Total Power Dissipation[4]	1.5	2.08	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	85	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	50	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V,	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}= ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.0	1.5	2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS}=10V, I_D=4A	-	29	38	mΩ
		V_{GS}=4.5V, I_D=3A	-	45	65	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1.0MHz	-	233	-	pF
C_{oss}	Output Capacitance		-	44	-	pF
C_{rss}	Reverse Transfer Capacitance		-	33	-	pF
Q_g	Total Gate Charge	V_{DS}=15V, I_D=2A, V_{GS}=10V	-	3	-	nC
Q_{gs}	Gate-Source Charge		-	0.5	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	0.8	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=15V, I_D=4A, R_{GEN}=3Ω, V_{GS}=10V	-	4	-	ns
t_r	Turn-on Rise Time		-	2.1	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	15	-	ns
t_f	Turn-off Fall Time		-	3.2	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	4.0	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S=4A	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Electrical Characteristics (T_J=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D= -250μA	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= -20V, V_{GS}=0V,	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}= ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D= -250μA	-1.0	-1.5	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS}= -10V, I_D= -3A	-	53	65	mΩ
		V_{GS}= -4.5V, I_D= -2A	-	75	93	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}= -10V, V_{GS}=0V, f=1.0MHz	-	393	-	pF
C_{oss}	Output Capacitance		-	47	-	pF
C_{rss}	Reverse Transfer Capacitance		-	38	-	pF
Q_g	Total Gate Charge	V_{DS}= -10V, I_D= -2A, V_{GS}= -4.5V	-	7.1	-	nC
Q_{gs}	Gate-Source Charge		-	1.2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	1.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}= -10V, I_D= -3A, R_G=1Ω, V_{GEN}= -4.5V, R_L=1.2Ω	-	9	-	ns
t_r	Turn-on Rise Time		-	2.88	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	22.3	-	ns
t_f	Turn-off Fall Time		-	3.9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-12	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= -3A	-	-	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

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

Typical Performance Characteristics

Figure1: Output Characteristics

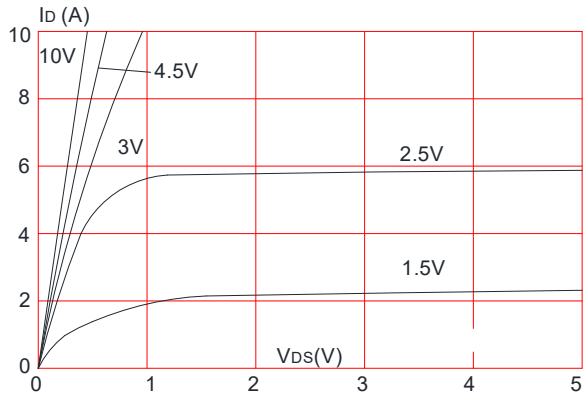


Figure 2: Typical Transfer Characteristics

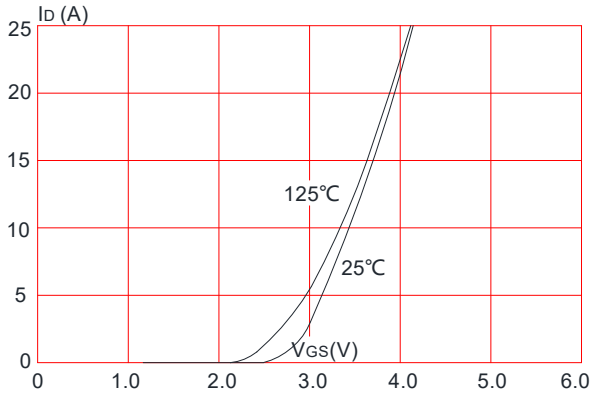


Figure 3: On-resistance vs. Drain Current

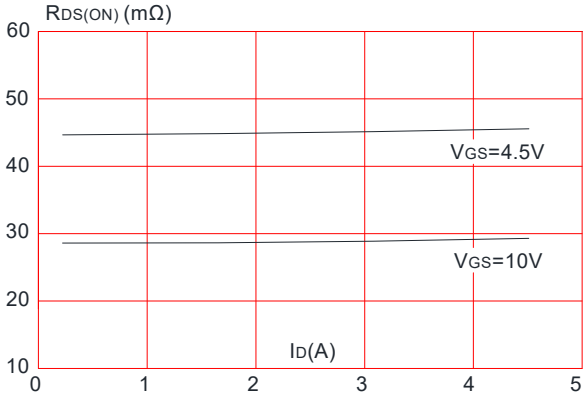


Figure 4: Body Diode Characteristics

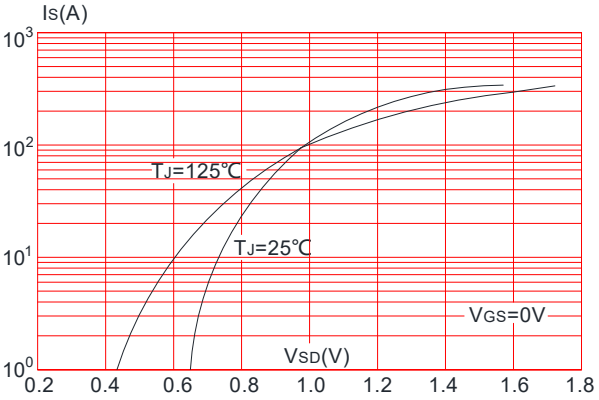


Figure 5: Gate Charge Characteristics

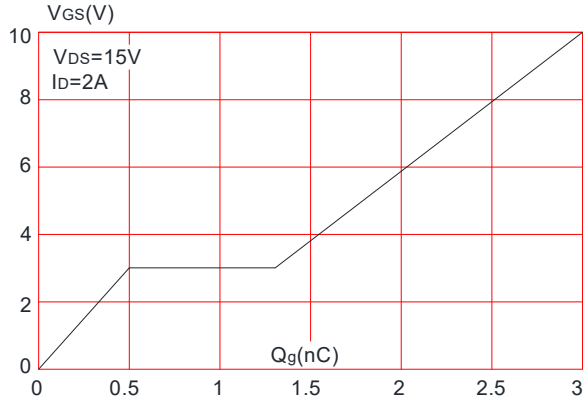


Figure 6: Capacitance Characteristics

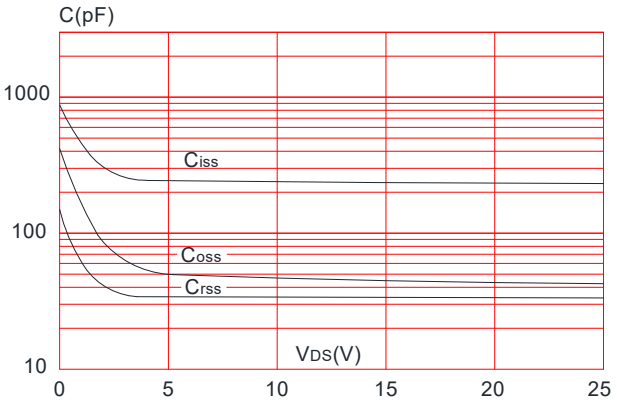


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

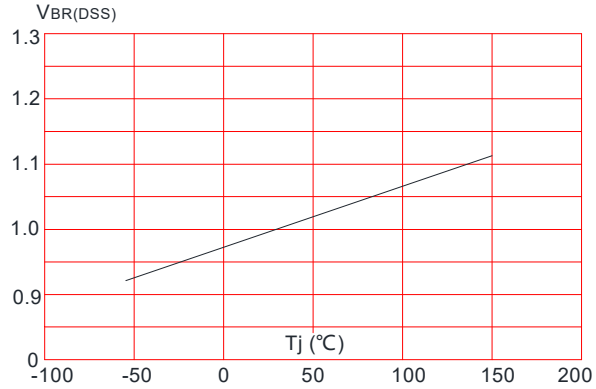


Figure 8: Normalized on Resistance vs. Junction Temperature

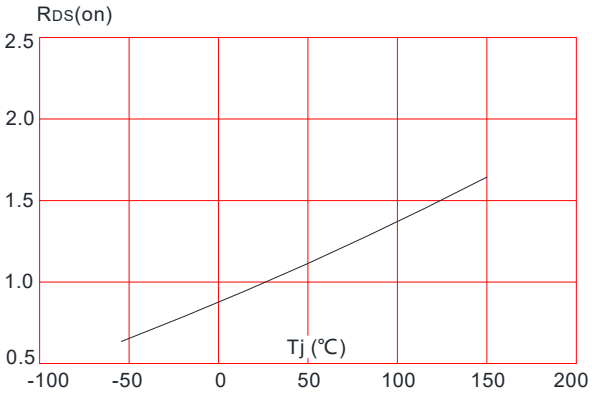


Figure 9: Maximum Safe Operating Area

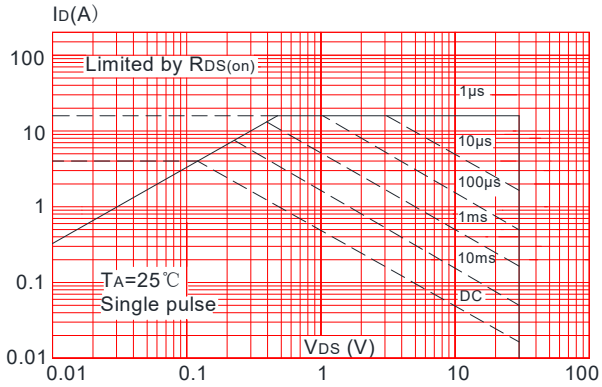


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

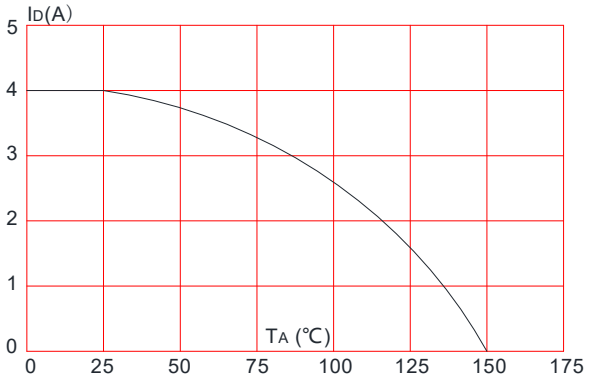
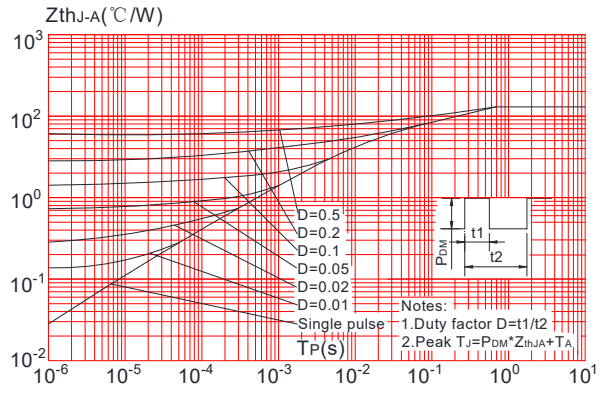


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Typical Performance Characteristics

Fig 1: Output Characteristics

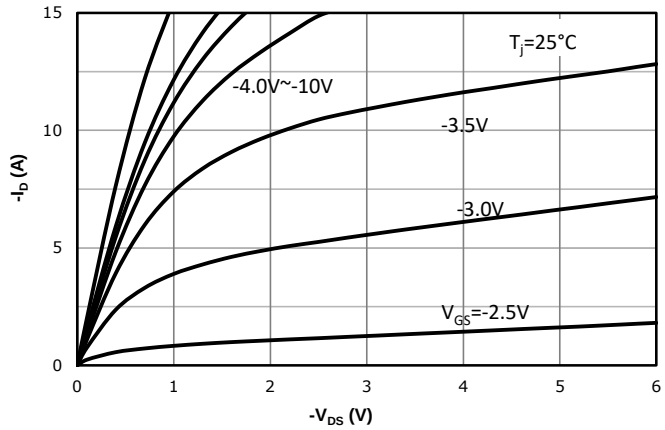


Fig 2: Transfer Characteristics

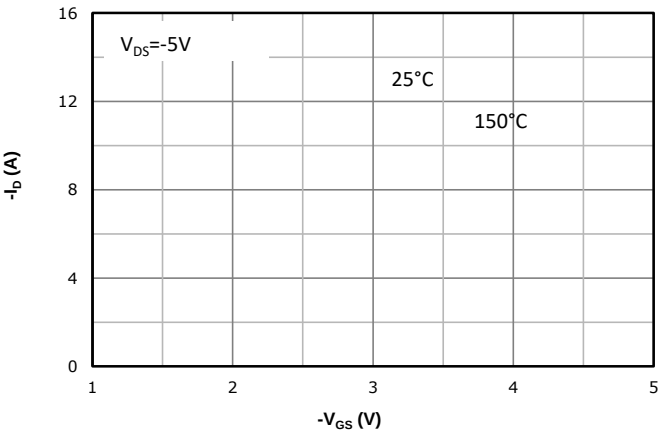


Fig 3: Rds(on) vs Drain Current and Gate Voltage

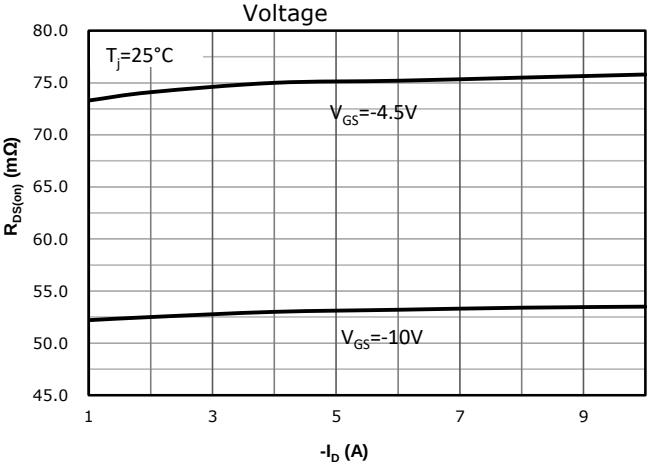


Fig 4: Rds(on) vs Gate Voltage

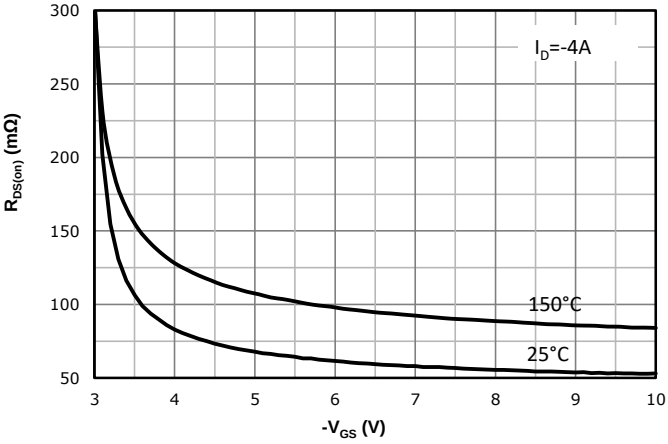


Fig 5: Rds(on) vs. Temperature

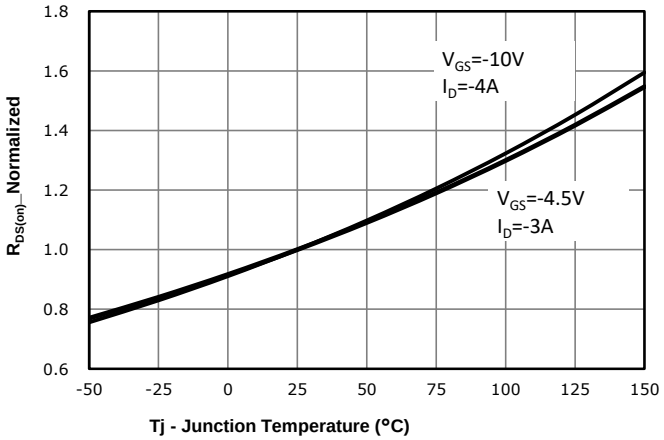


Fig 6: Vgs(th) vs. Temperature

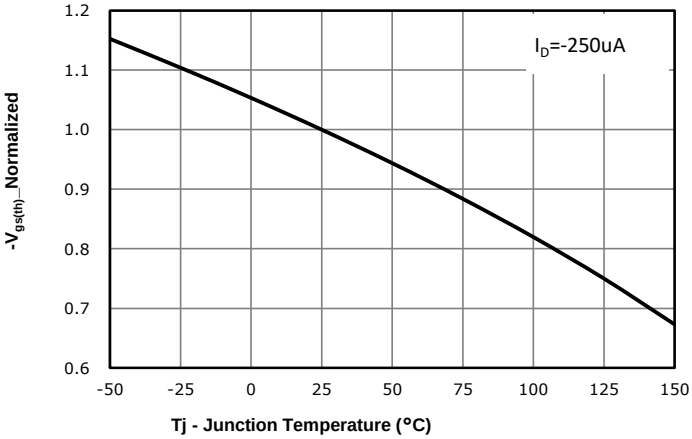


Fig 7: BVdss vs. Temperature

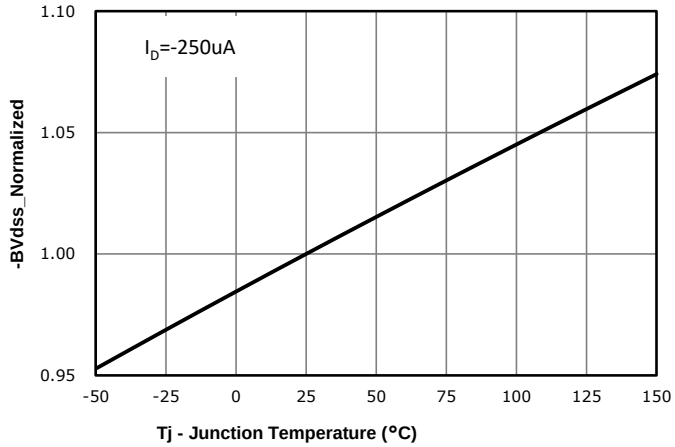


Fig 8: Body-diode Forward Characteristics

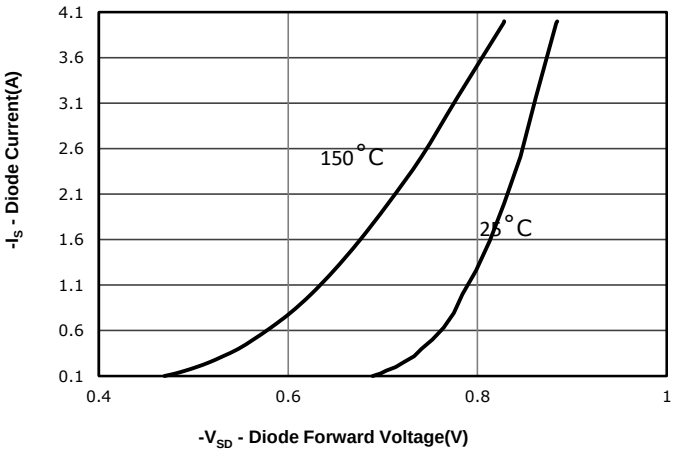


Fig 9: Gate Charge Characteristics

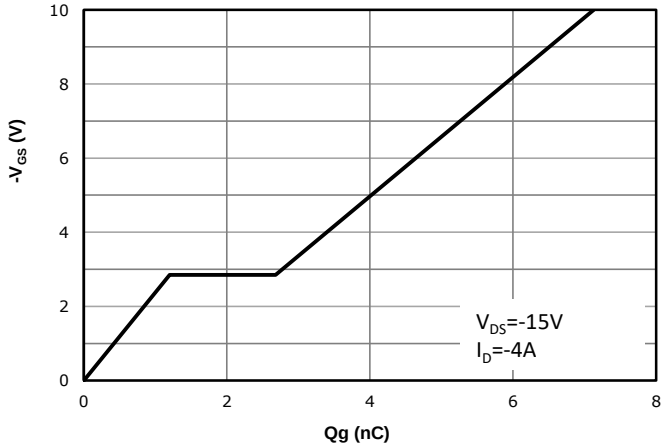


Fig 10: Capacitance Characteristics

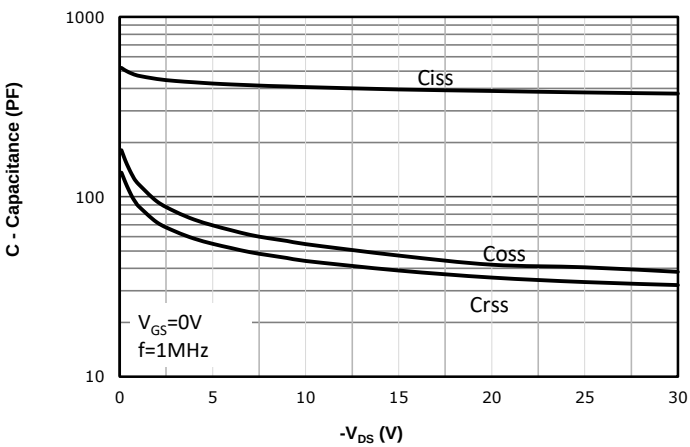


Fig 11: Drain Current Derating

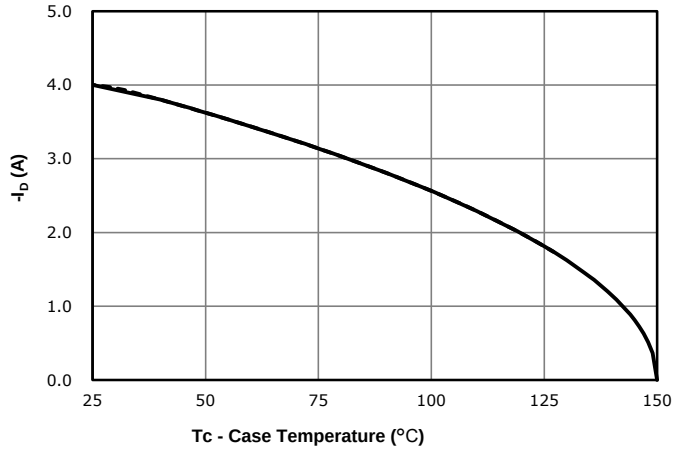


Fig 12: Power Dissipation

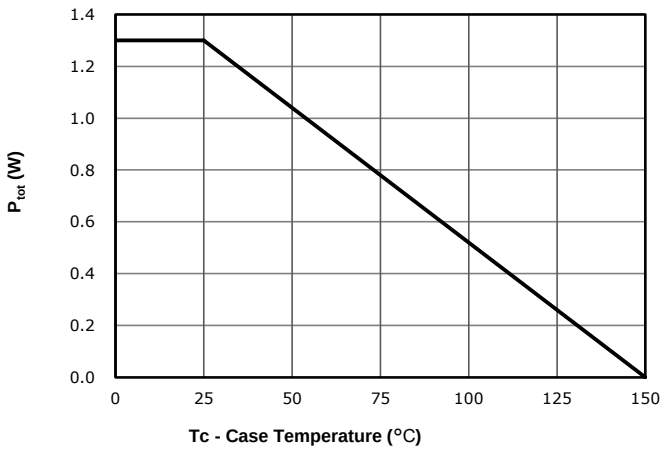


Fig 13: Safe Operating Area

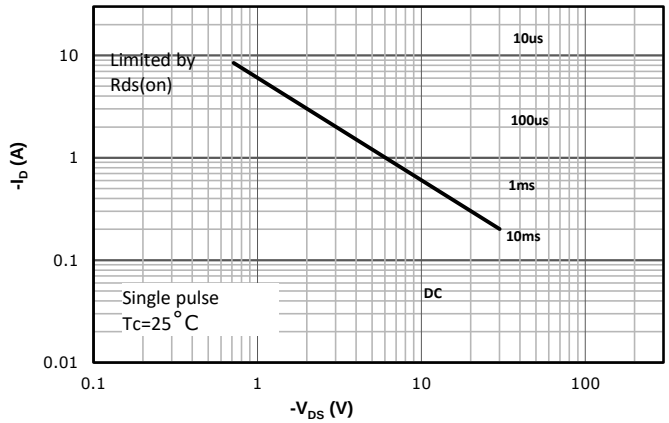
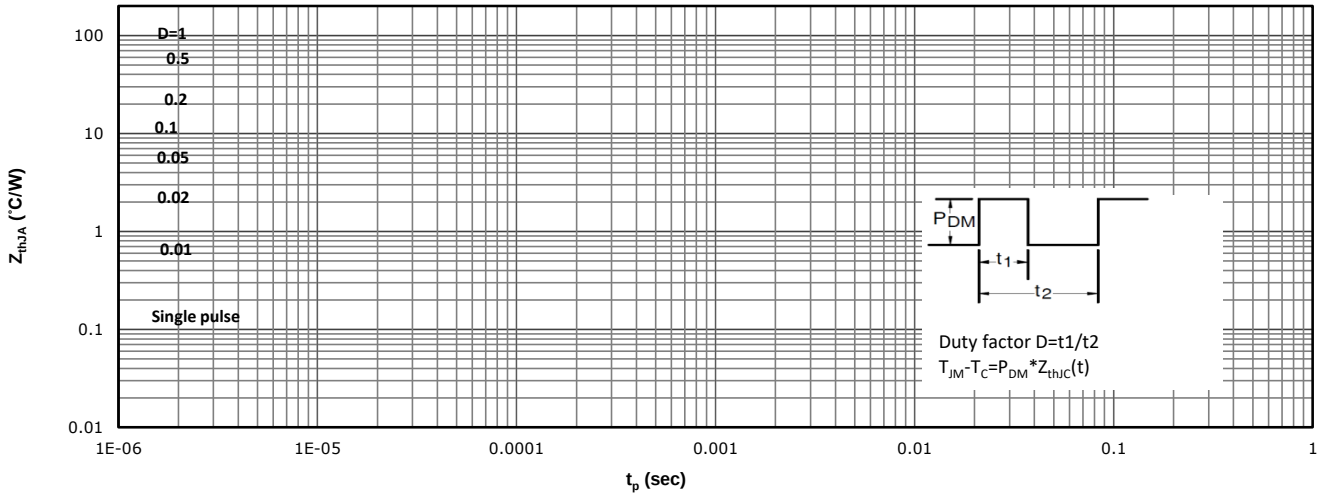
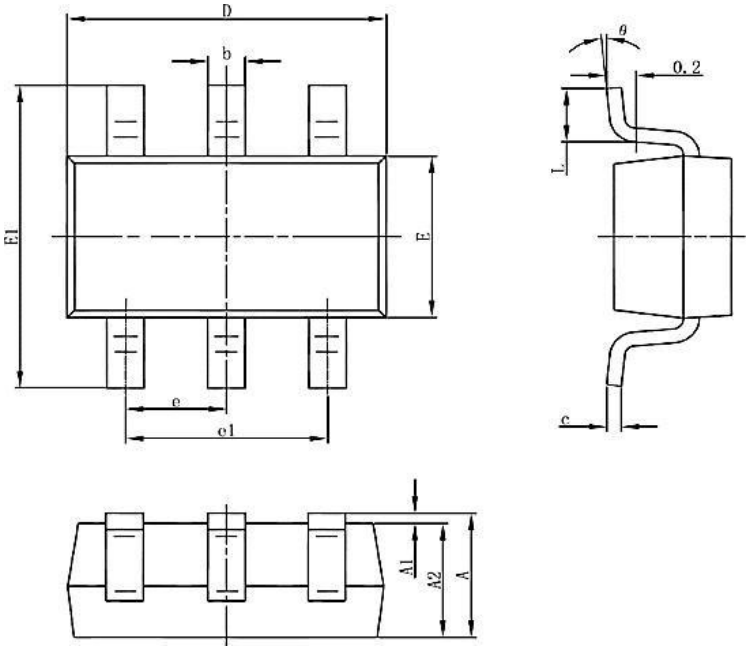


Fig 14: Max. Transient Thermal Impedance



Package Mechanical Data-SOT23-6-Double



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