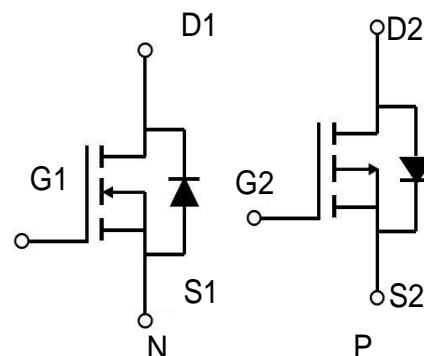




### General Description

The WL4G03L 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 WL4G03L meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.



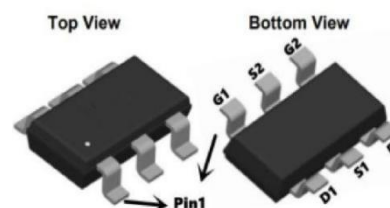
### Features

- 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

### SOT23-6L Pin Configuration



### Product Summary

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

### Absolute Maximum Ratings

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



**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	85	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	50	°C/W

**Electrical Characteristics** (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note2</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =4A	-	29	38	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	-	45	65	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz	-	233	-	pF
C <sub>oss</sub>	Output Capacitance		-	44	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	33	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>D</sub> =2A, V <sub>GS</sub> =10V	-	3	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	0.5	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	0.8	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =15V, I <sub>D</sub> =4A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	4	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	2.1	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	15	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	3.2	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	4.0	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =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** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V,$	-	-	-1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note2</small>	$V_{GS}=-4.5V, I_D=-3A$	-	53	65	m $\Omega$
		$V_{GS}=-2.5V, I_D=-2A$	-	75	93	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	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
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-10V, I_D=-3A,$ $R_G=1\Omega, V_{GEN}=-4.5V,$ $R_L=1.2\Omega$	-	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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	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 $\leq 300\mu s$ , Duty Cycle $\leq 2\%$



### Typical Performance Characteristics

Figure 1: Output Characteristics

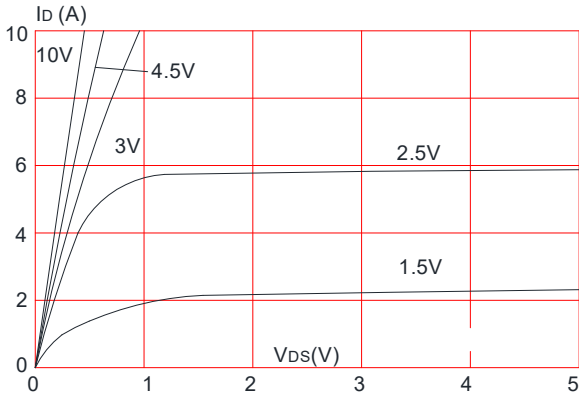


Figure 2: Typical Transfer Characteristics

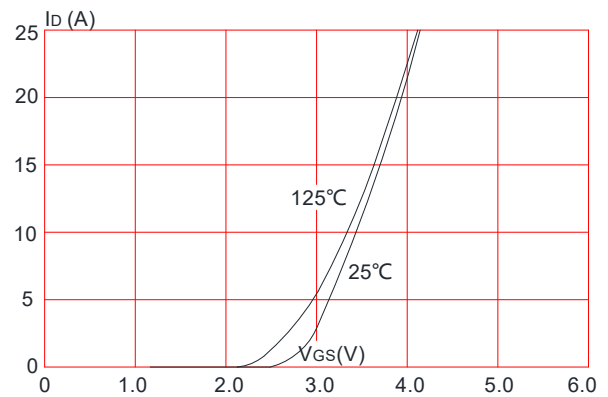


Figure 3: On-resistance vs. Drain Current

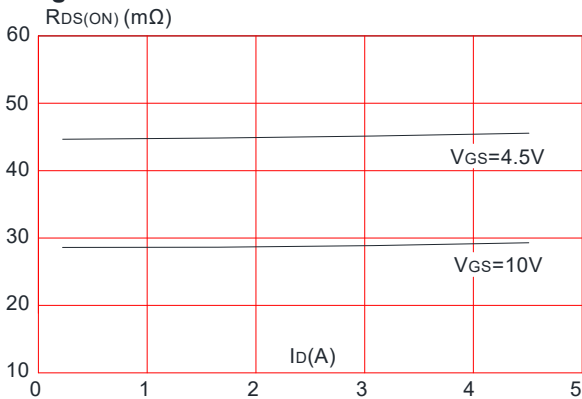


Figure 4: Body Diode Characteristics

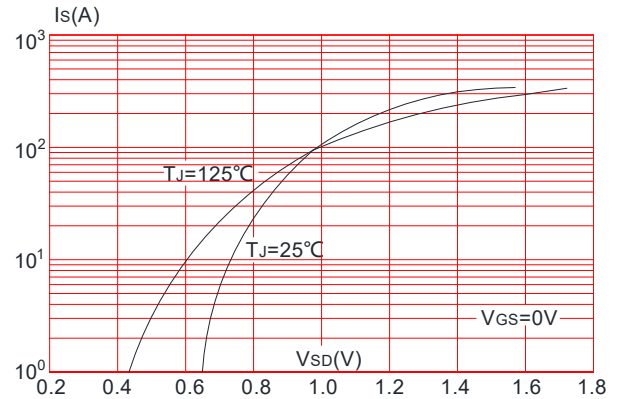


Figure 5: Gate Charge Characteristics

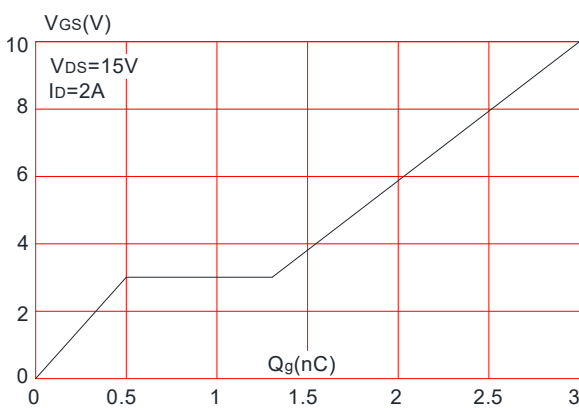
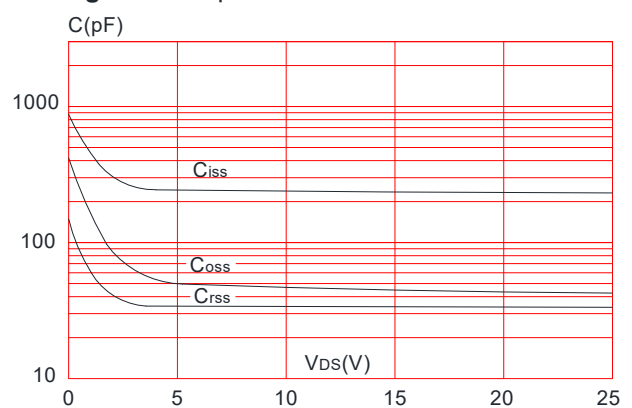
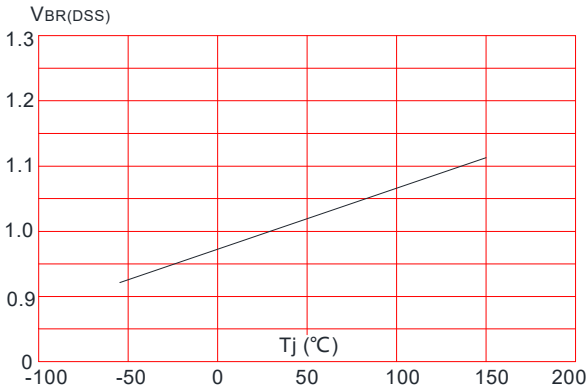


Figure 6: Capacitance Characteristics

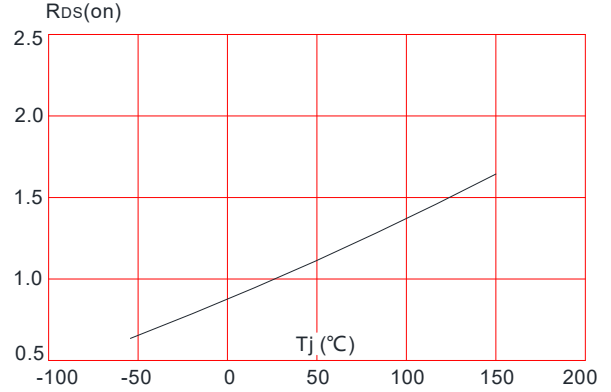




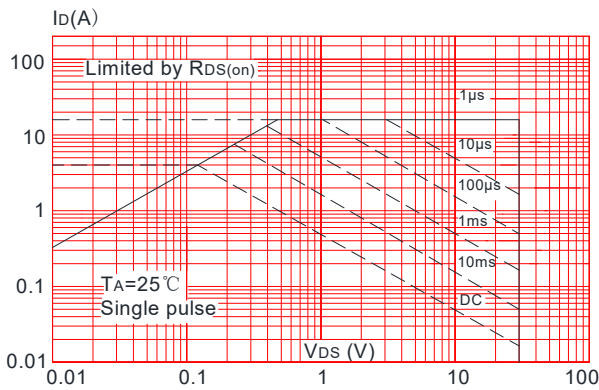
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



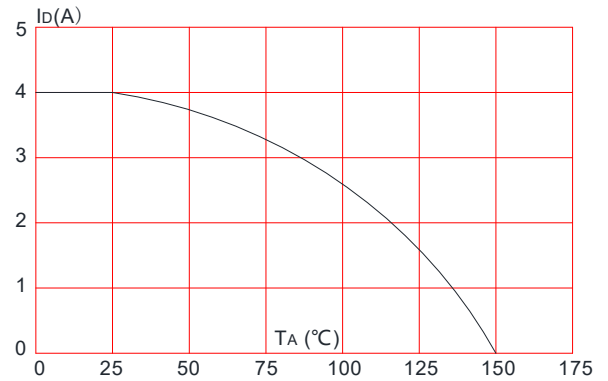
**Figure 8:** Normalized on Resistance vs. Junction Temperature



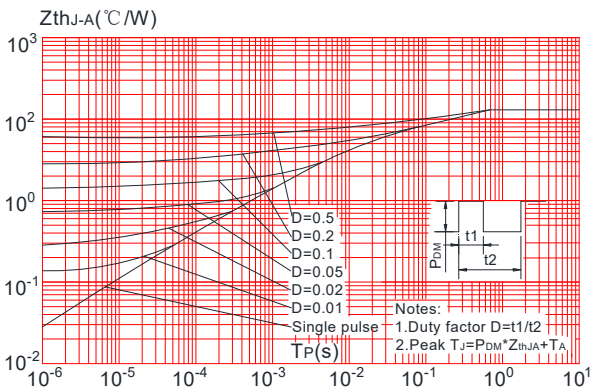
**Figure 9:** Maximum Safe Operating Area



**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

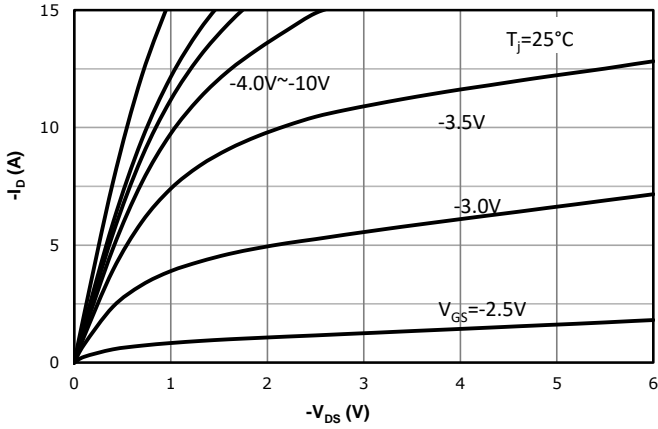


Fig 2: Transfer Characteristics

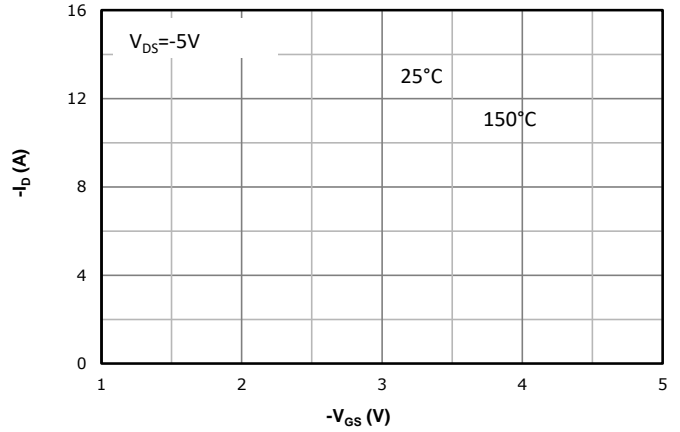


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

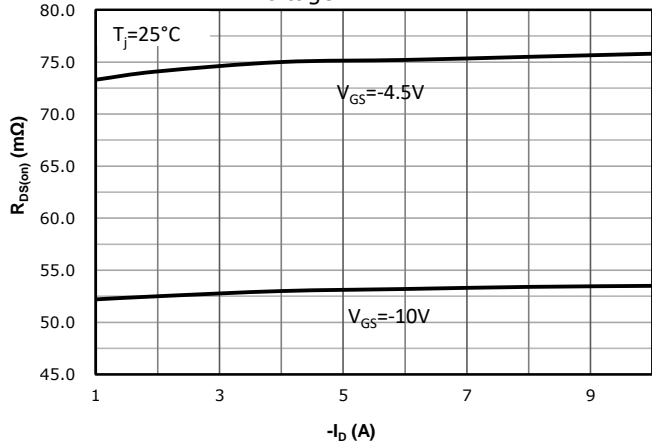


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

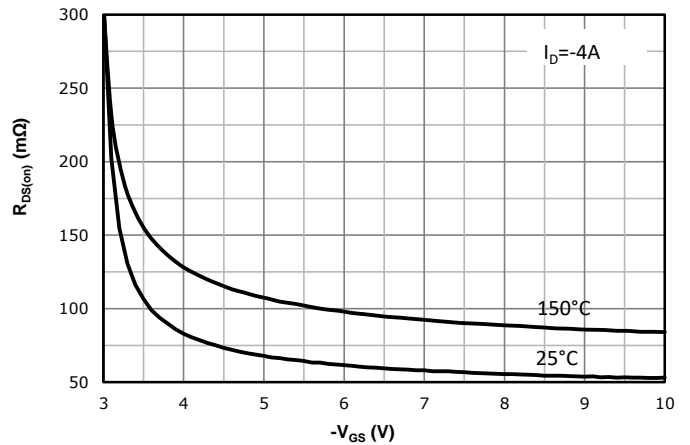


Fig 5:  $R_{DS(on)}$  vs. Temperature

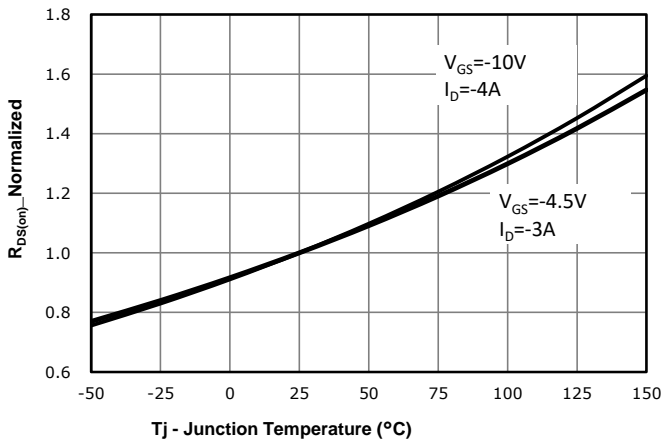


Fig 6:  $V_{GS(th)}$  vs. Temperature

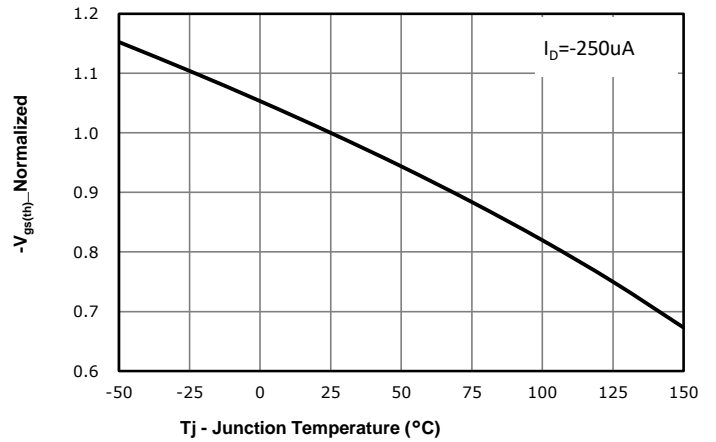




Fig 7: BVdss vs. Temperature

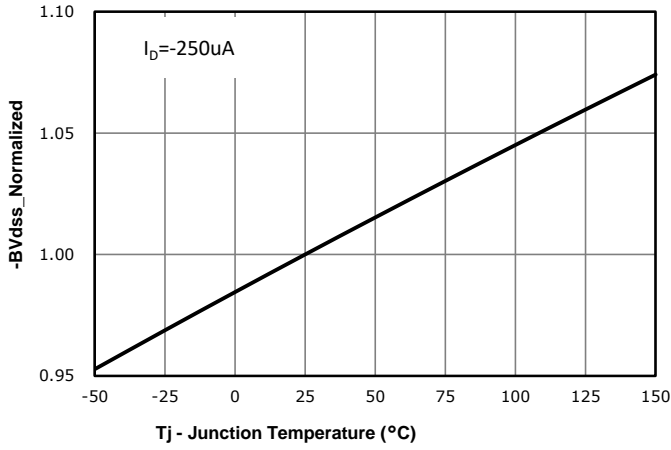


Fig 8: Body-diode Forward Characteristics

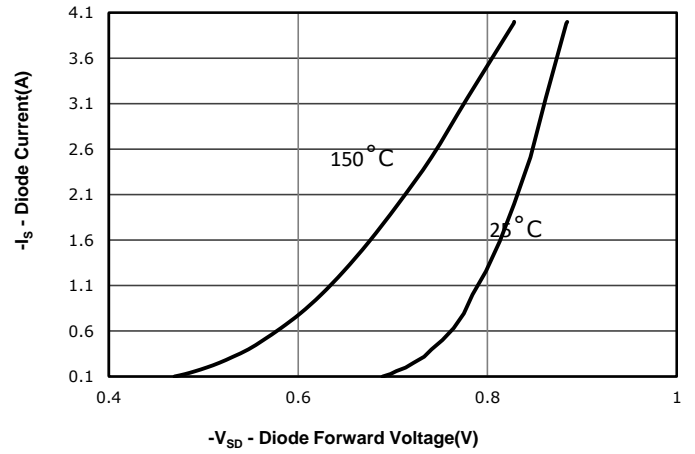


Fig 9: Gate Charge Characteristics

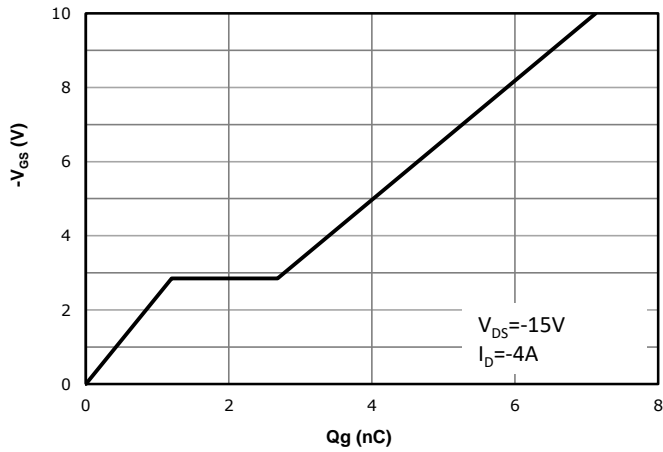


Fig 10: Capacitance Characteristics

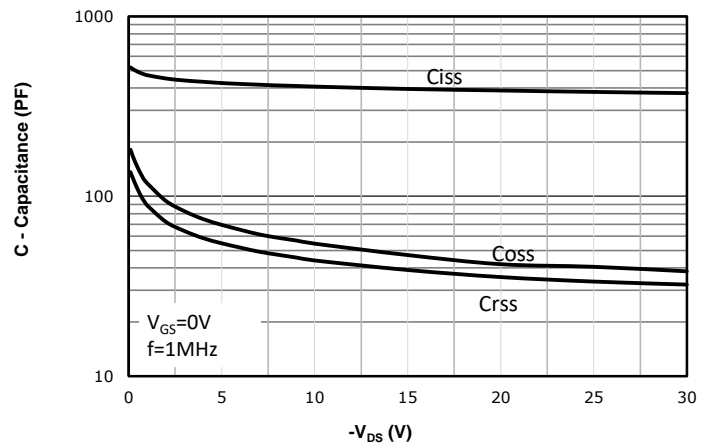


Fig 11: Drain Current Derating

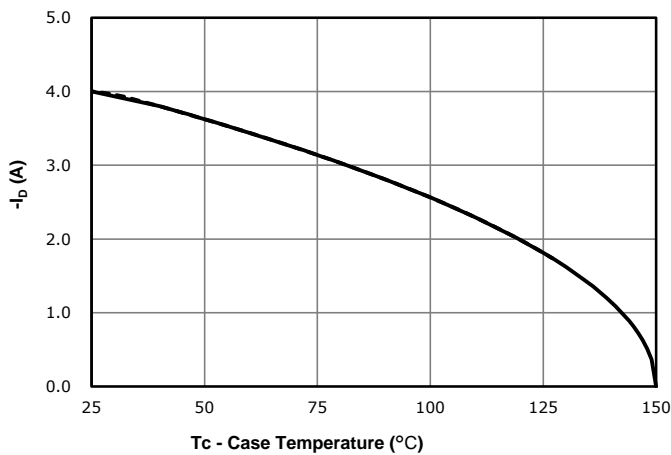


Fig 12: Power Dissipation

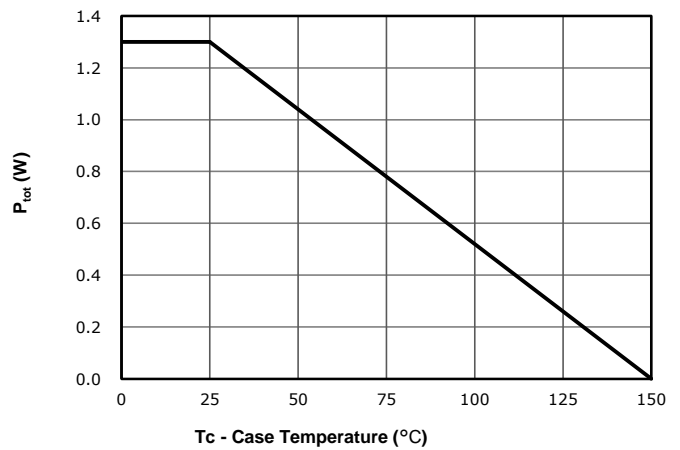




Fig 13: Safe Operating Area

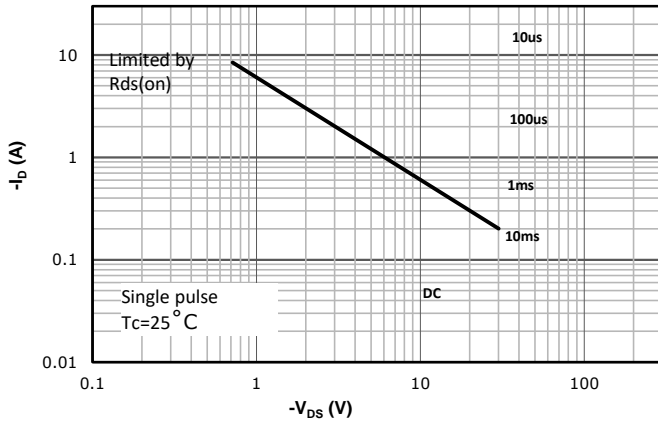
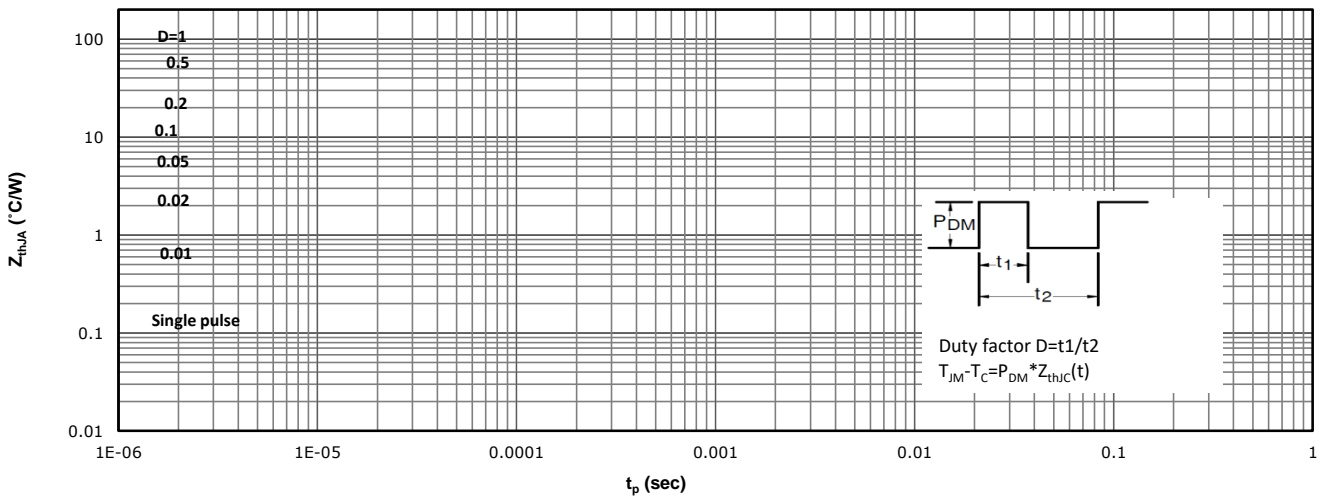
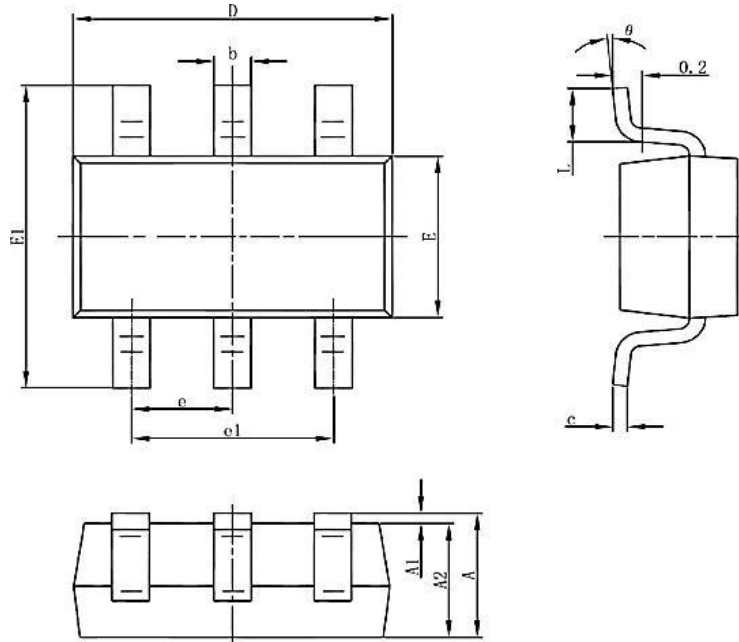


Fig 14: Max. Transient Thermal Impedance





### 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



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