

## FEATURES

30V, 6.0A,  $R_{DS(ON)} = 18m\Omega$  @  $V_{GS} = 10V$

Improved  $dv/dt$  capability

Fast switching

Green Device Available

## APPLICATION

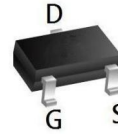
MB / VGA / Vcore

Load Switch

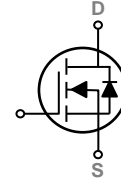
Hand-Held Instrument

$V_{DSS}$  30 V  
 $I_D$  6 A  
 $R_{DS(ON)}$  18 m $\Omega$

X4ZL



SOT23-3L top view



Schematic Diagram

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )	6.0	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	3.8	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	23	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	1.4	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.012	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	80	$^\circ\text{C}/\text{W}$

## Electrical characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.04	---	$V/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>3</sup>	$V_{GS}=10V, I_D=5.5A$	---	18	25	$m\Omega$
		$V_{GS}=4.5V, I_D=4A$	---	27	40	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4	---	$mV/^\circ\text{C}$

### Dynamic and switching Characteristics

$Q_g$	Total Gate Charge <sup>3,4</sup>	$V_{DS}=15V, V_{GS}=4.5V, I_D=6A$	---	4.1	---	nC
$Q_{gs}$	Gate-Source Charge <sup>3,4</sup>		---	1	---	
$Q_{gd}$	Gate-Drain Charge <sup>3,4</sup>		---	2.1	---	
$T_{d(on)}$	Turn-On Delay Time <sup>3,4</sup>	$V_{DD}=15V, V_{GS}=10V, R_G=6\Omega$ $I_D=1A$	---	2.8	---	ns
$T_r$	Rise Time <sup>3,4</sup>		---	7.2	---	
$T_{d(off)}$	Turn-Off Delay Time <sup>3,4</sup>		---	15.8	---	
$T_f$	Fall Time <sup>3,4</sup>		---	4.6	---	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	345	---	pF
$C_{oss}$	Output Capacitance		---	55	---	
$C_{rss}$	Reverse Transfer Capacitance		---	32	---	

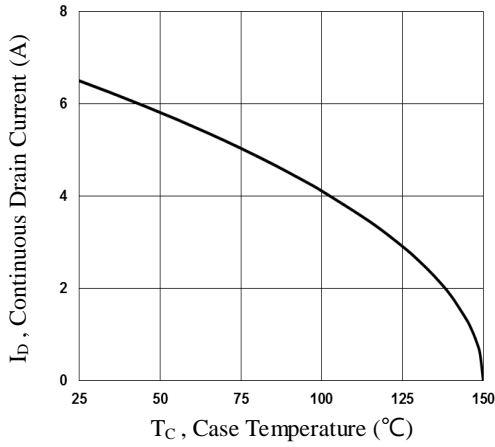
### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	6.0	A
$I_{SM}$	Pulsed Source Current <sup>3</sup>		---	---	12	A
$V_{SD}$	Diode Forward Voltage <sup>3</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V

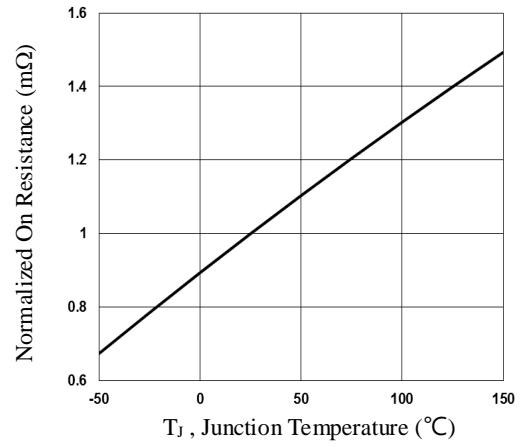
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=1\text{mH}, I_{AS}=8A, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

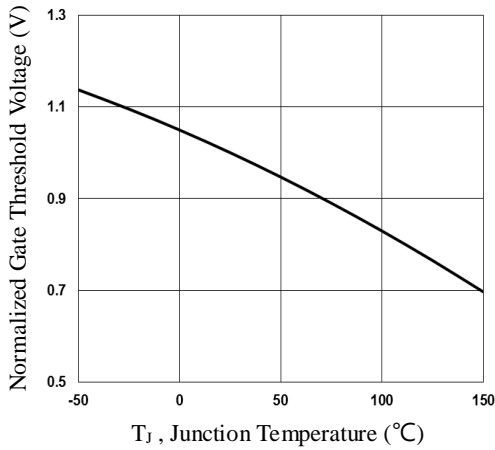
RATING AND CHARACTERISTIC CURVES



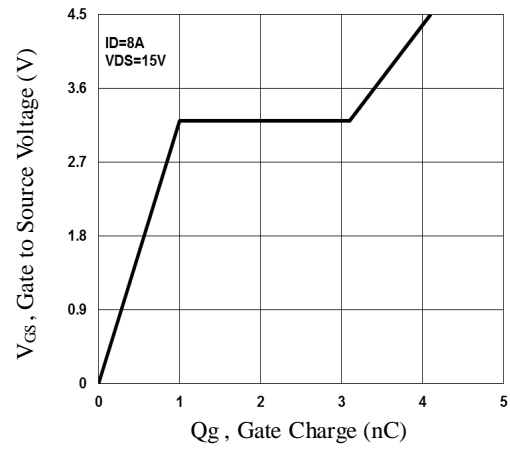
**Fig.1 Continuous Drain Current vs.  $T_c$**



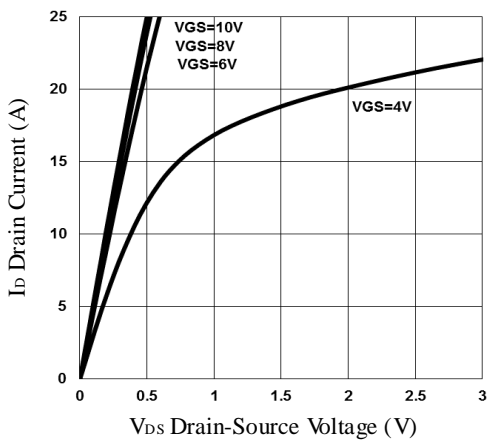
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



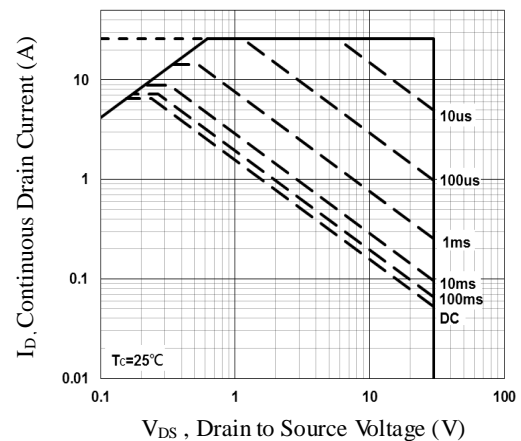
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

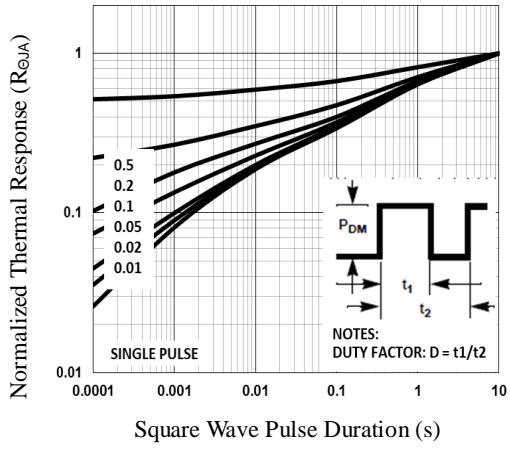


**Fig.5 On Region Characteristics**

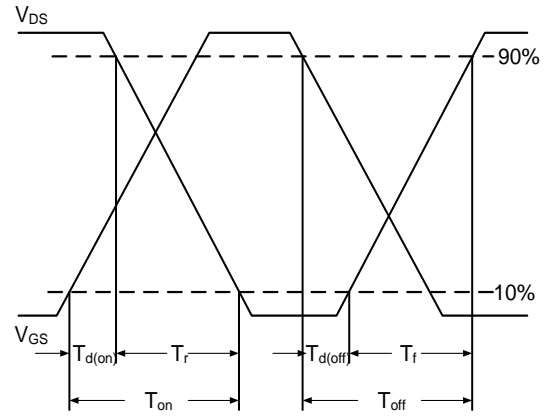


**Fig.6 Maximum Safe Operation Area**

RATING AND CHARACTERISTIC CURVES



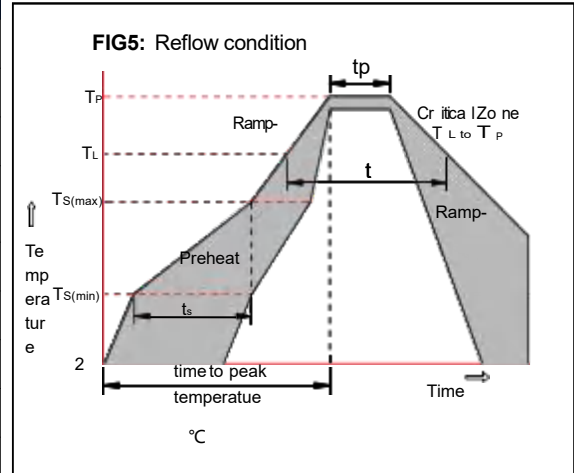
**Fig.7 Normalized Transient Response**



**Fig.8 Switching Time Waveform**

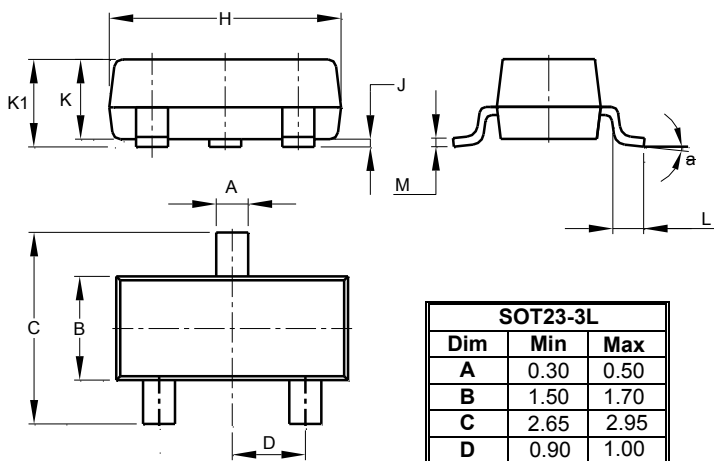
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max ( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature ( $T_L$ ) (Liquid us)	+217°C
	-Temperature ( $t_L$ )	60-150 secs.
Peak Temp ( $T_P$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_P$ )		8 min. Max
Do not exceed		+260°C



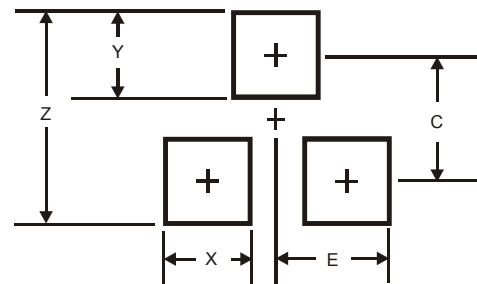
Package Dimensions & Suggested Pad Layout

SOT23-3L



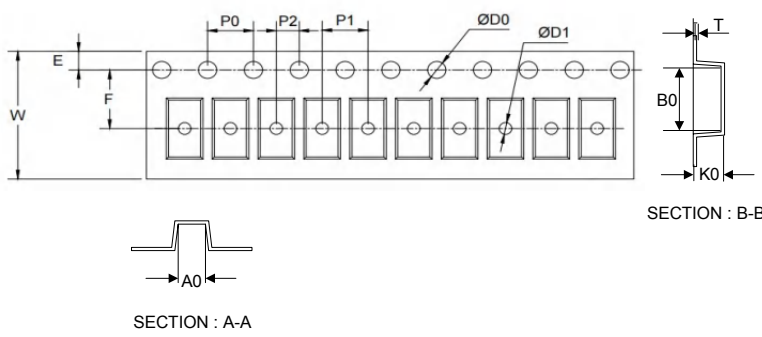
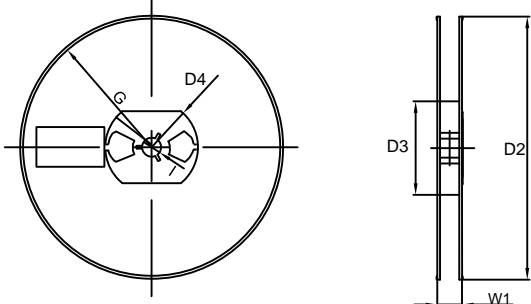
SOT23-3L		
Dim	Min	Max
A	0.30	0.50
B	1.50	1.70
C	2.65	2.95
D	0.90	1.00
H	2.82	3.02
J		0.10
K	1.05	1.15
K1	1.05	1.25
L	0.30	0.60
M	0.10	0.20
a	0°	8°

All Dimensions in mm



Dimensions	SOT23-3L
Z	3.3
X	0.9
Y	1.0
C	2.3
E	1.40

Tape & reel specification

Tape	Symbol	Dimension (mm)	
	P0	4.00±0.20	
	P1	4.00±0.20	
	P2	2.00±0.20	
	D0	1.55±0.20	
	D1	1.05±0.20	
	E	1.55±0.20	
	F	3.60±0.20	
	W	8.00±0.20	
	A0	3.80±0.20	
	B0	3.50±0.20	
	K0	1.55±0.20	
	T	0.25±0.15	
	<p>7" Reel</p> 	D2	178.0±5.0
		D3	55Min.
		D4	R24.0±3.0
G		R82.0±3.0	
I		13.0±2.0	
W1	11.0±3.0		
Quantity: 3000PCS			