

FEATURES

20V, 4A, $R_{DS(ON)}=32m\Omega@V_{GS}=4.5V$

Improved dv/dt capability

Fast switching

Green Device Available

V_{DSS} 20 V
 I_D 4 A
 $R_{DS(ON)}$ 32 m Ω

APPLICATION

Notebook

Load Switch

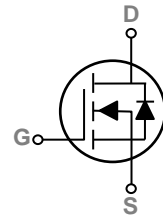
Hand-Held Instruments

3414



SOT23-3L top view

Equivalent Circuit



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	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	4	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	3.2	A
I_{DM}	Drain Current – Pulsed ¹	20	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	1.56	W
	Power Dissipation – Derate above 25°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	$V_{GS}=0V, I_D=250\mu A$	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.02	---	$V/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=16V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=4.5V, I_D=4A$	---	30	40	$m\Omega$
		$V_{GS}=2.5V, I_D=3A$	---	42	55	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.4	---	1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2	---	$mV/^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=10V, I_S=2A$	---	4.4	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=10V, V_{GS}=4.5V, I_D=4A$	---	5.8	---	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	0.6	---	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	1.5	---	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DD}=10V, V_{GS}=4.5V, R_G=25\Omega, I_D=1A$	---	2.9	---	ns
T_r	Rise Time ^{2, 3}		---	8.4	---	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	19.2	---	
T_f	Fall Time ^{2, 3}		---	5.6	---	
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$	---	315	---	pF
C_{oss}	Output Capacitance		---	50	---	
C_{riss}	Reverse Transfer Capacitance		---	40	---	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	4	A
I_{SM}	Pulsed Source Current		---	---	8	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=1\text{mH}, I_{AS}=8A, R_G=25\Omega, \text{Starting } T_J=25^{\circ}\text{C}$.
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

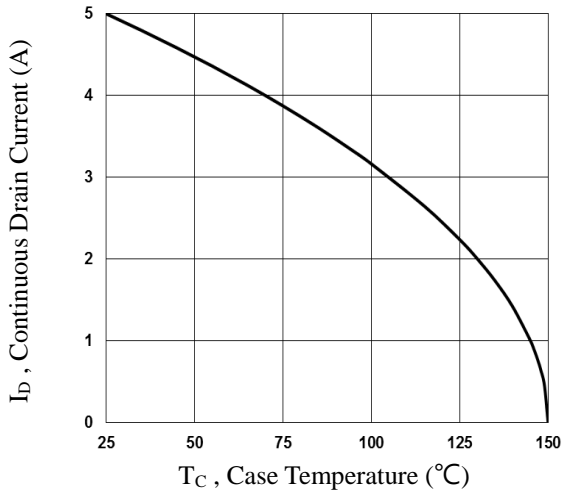


Fig.1 Continuous Drain Current vs. T_c

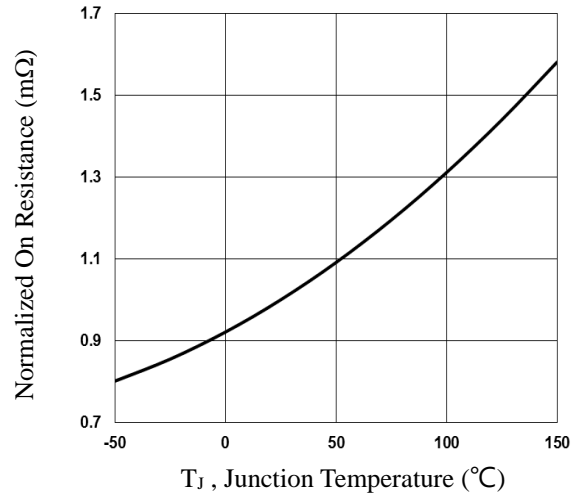


Fig.2 Normalized R_{DS(on)} vs. T_j

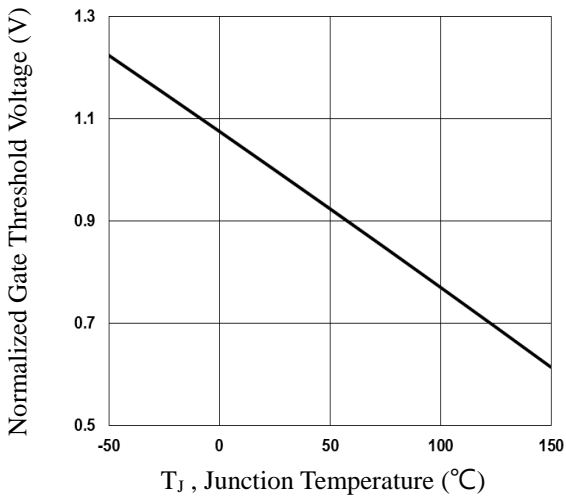


Fig.3 Normalized V_{th} vs. T_j

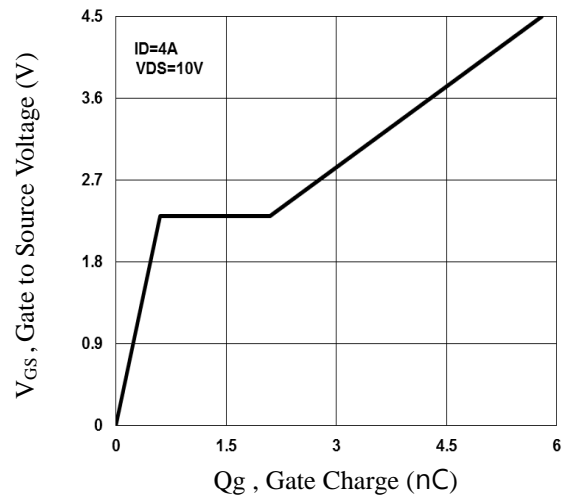


Fig.4 Gate Charge Waveform

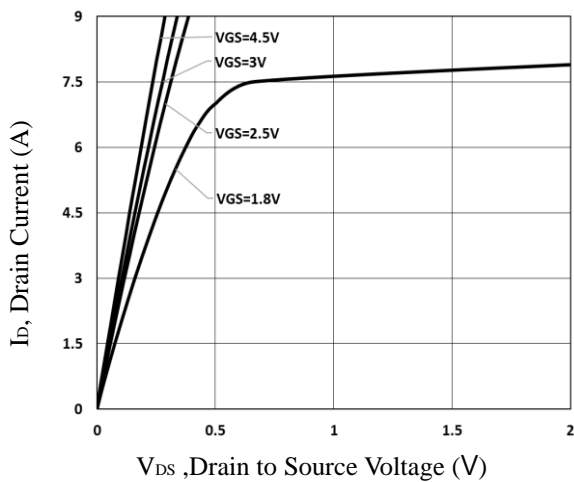


Fig.5 Typical Output Characteristics

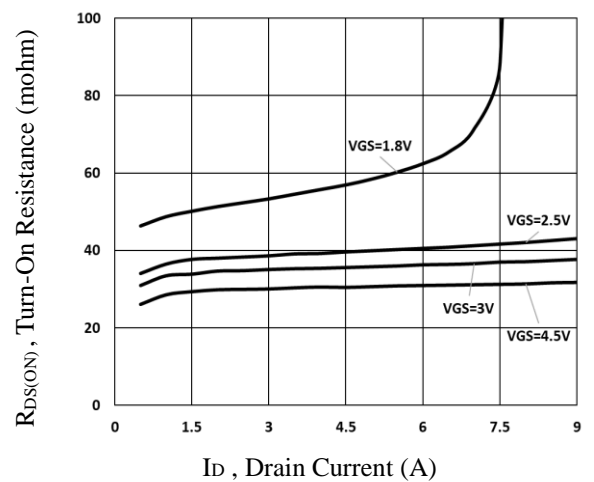


Fig.6 Turn-On Resistance vs. I_D

RATING AND CHARACTERISTIC CURVES

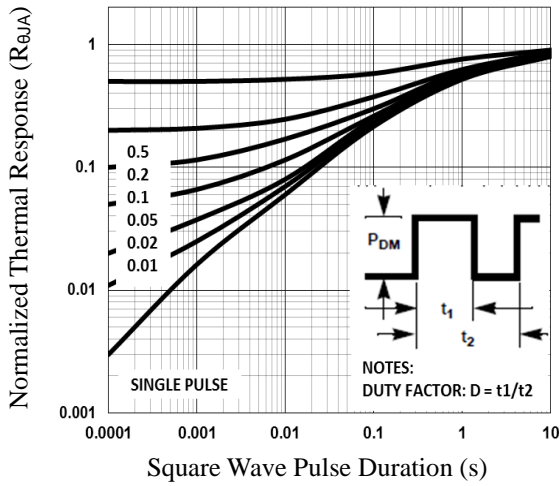


Fig.7 Normalized Transient Impedance

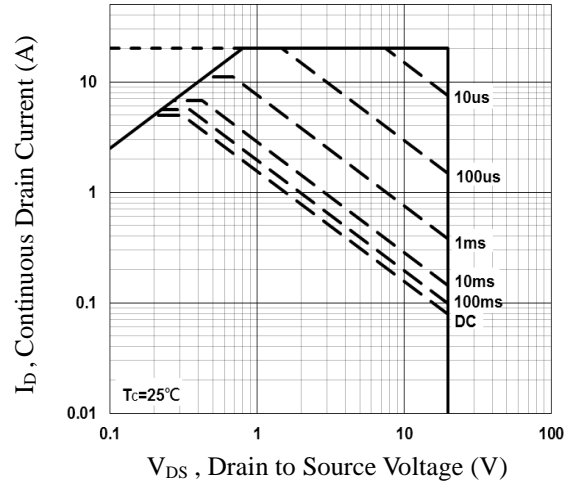


Fig.8 Maximum Safe Operation Area

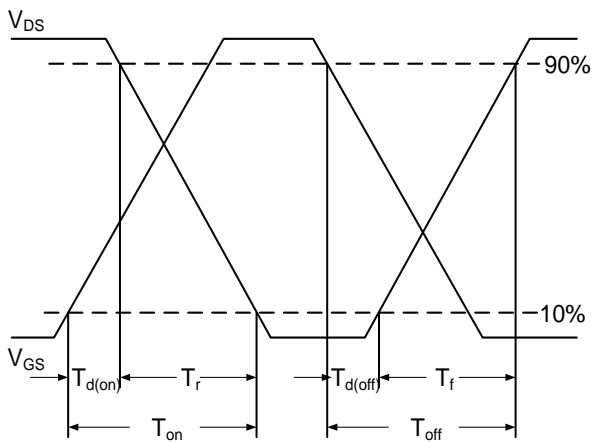


Fig.9 Switching Time Waveform

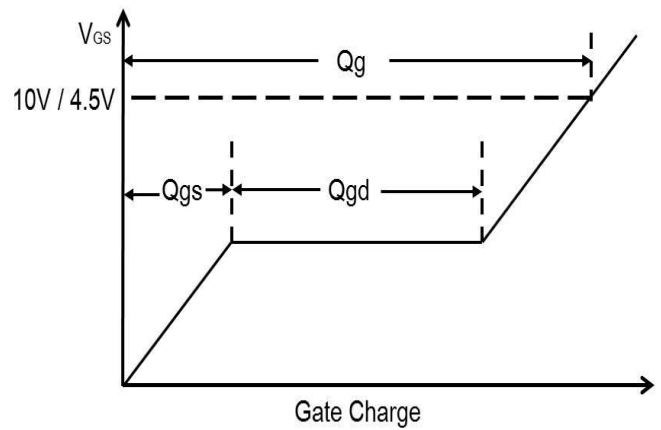


Fig.10 Gate Charge Waveform

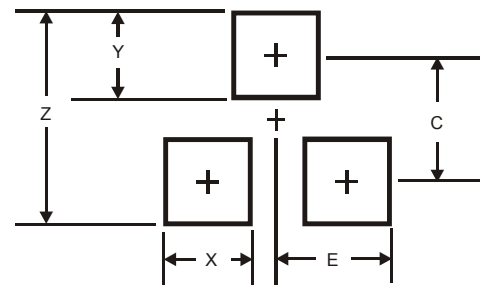
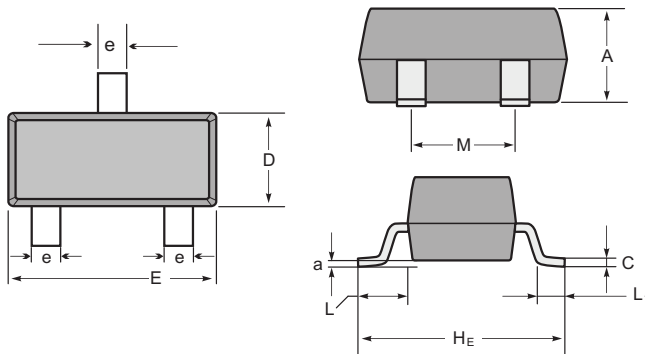
Soldering parameters

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) (ts)	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



SOT-23 mechanical data

UNIT	A	C	D	E	H_E	e	M	L	L_1	a	
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7			0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	87	12	67			6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

Tape & reel specification

Tape		Symbol	Dimension (mm)
		P0	4.00±0.10
		P1	4.00±0.10
		P2	2.00±0.10
		D0	1.55±0.10
		D1	1.05±0.10
		E	1.55±0.10
		F	3.60±0.10
		W	8.00±0.10
		A0	3.80±0.20
		B0	3.25±0.20
		K0	1.45±0.10
		T	0.25±0.05
		D2	178.0±3.0
		D3	55Min.
		D4	R24.0±3.0
G	R82.0±3.0		
I	13.0±2.0		
W1	11.0±3.0		
Quantity: 3000PCS			

7" Reel	