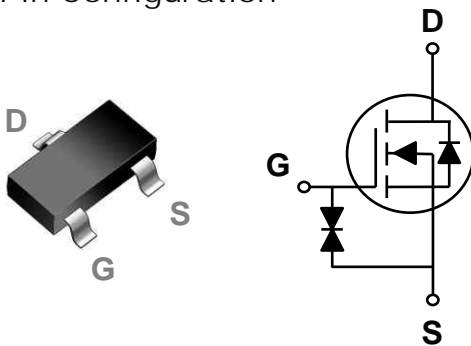


## 20V N-Channel MOSFETs

### General Description

These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### SOT-323 Pin Configuration



BVDSS	RDSON	ID
20V	300mΩ	800mA

### Features

- 20V,800mA,  $R_{DS(ON)} = 300m\Omega$  @  $V_{GS} = 4.5V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available
- Suit for 1.5V Gate Drive Applications

### Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

### Absolute Maximum Ratings (Tc=25 °C unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	± 8	V
$I_D$	Drain Current – Continuous (T <sub>C</sub> =25 °C)	800	mA
	Drain Current – Continuous (T <sub>C</sub> =100 °C)	510	mA
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	3.2	A
$P_D$	Power Dissipation (T <sub>C</sub> =25 °C)	275	mW
	Power Dissipation – Derate above 25 °C	2.2	mW/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	450	°C/W



# FTK2320U

## 20V N-Channel MOSFETs

Electrical Characteristics ( $T_J=25\text{ }^\circ\text{C}$ , 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 $25\text{ }^\circ\text{C}$ , $I_D=1mA$	---	-0.01	---	V/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=20V, V_{GS}=0V, T_J=25\text{ }^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=16V, V_{GS}=0V, T_J=125\text{ }^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 6V, V_{DS}=0V$	---	---	$\pm 20$	$\mu A$

### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=0.5A$	---	200	300	m $\Omega$
		$V_{GS}=2.5V, I_D=0.4A$	---	235	400	
		$V_{GS}=1.8V, I_D=0.2A$	---	295	550	
		$V_{GS}=1.5V, I_D=0.1A$	---	365	800	
		$V_{GS}=1.2V, I_D=0.1A$	---	600	1500	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.3	0.6	1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/ $^\circ\text{C}$

### Dynamic and switching Characteristics

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=10V, V_{GS}=4.5V, I_D=0.5A$	---	1	2	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	0.26	0.5	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	0.2	0.4	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=10V, V_{GS}=4.5V, R_G=10\Omega, I_D=0.5A$	---	5	10	ns
$T_r$	Rise Time <sup>2,3</sup>		---	3.5	7	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	14	28	
$T_f$	Fall Time <sup>2,3</sup>		---	6	12	
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V, F=1MHz$	---	38.2	75	pF
$C_{oss}$	Output Capacitance		---	14.4	28	
$C_{riss}$	Reverse Transfer Capacitance		---	6	12	

### 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	---	---	0.8	A
$I_{SM}$	Pulsed Source Current		---	---	1.6	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=0.2A, T_J=25\text{ }^\circ\text{C}$	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

## 20V N-Channel MOSFETs

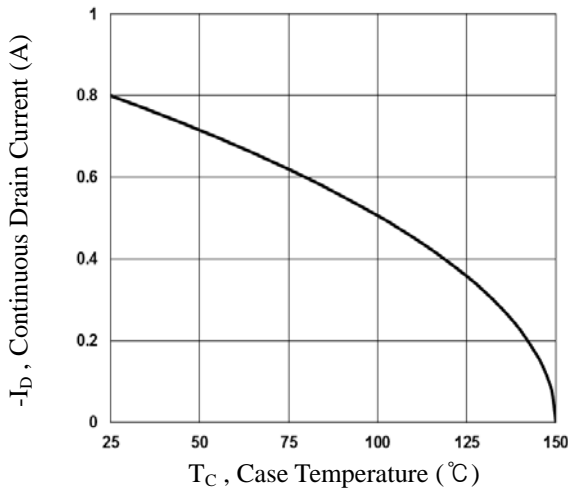


Fig.1 Continuous Drain Current vs.  $T_c$

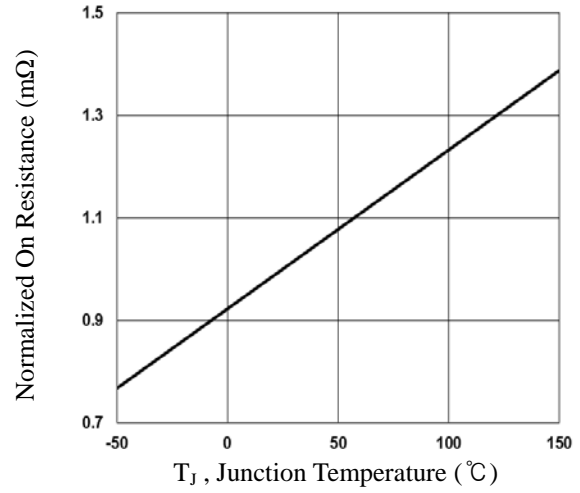


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

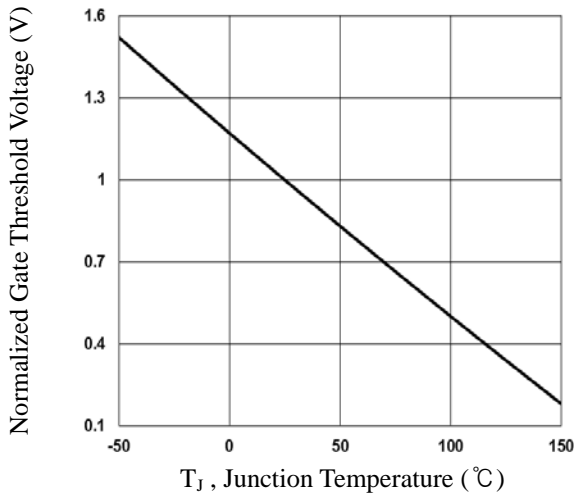


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

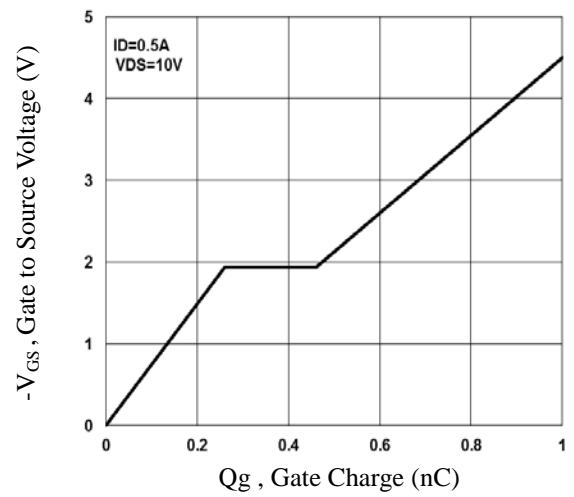


Fig.4 Gate Charge Waveform

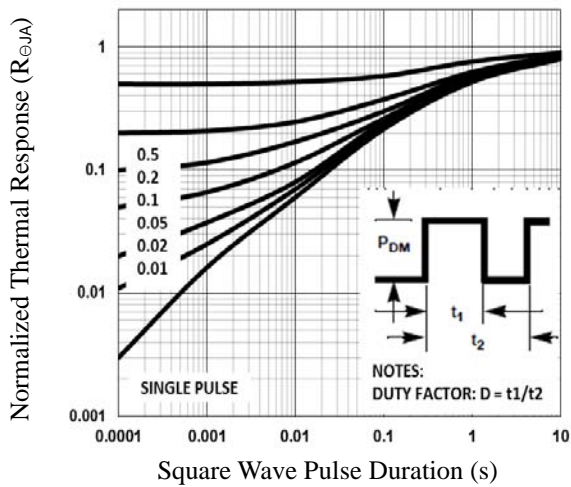


Fig.5 Normalized Transient Response

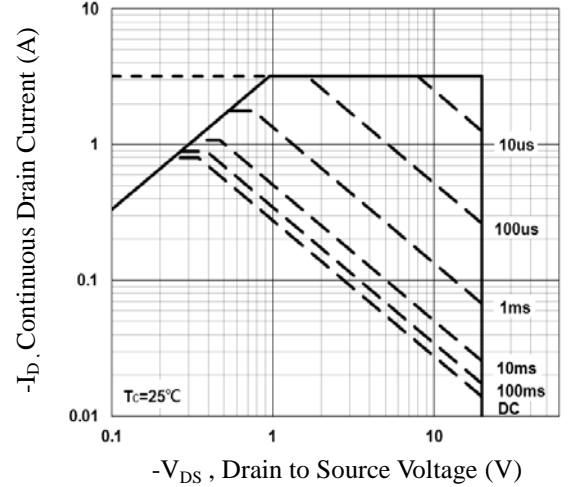


Fig.6 Maximum Safe Operation Area

## 20V N-Channel MOSFETs

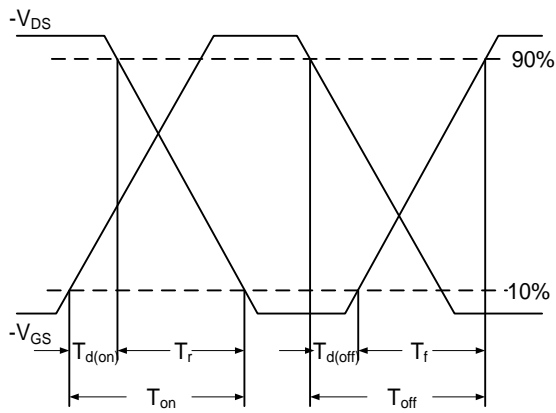


Fig.7 Switching Time Waveform

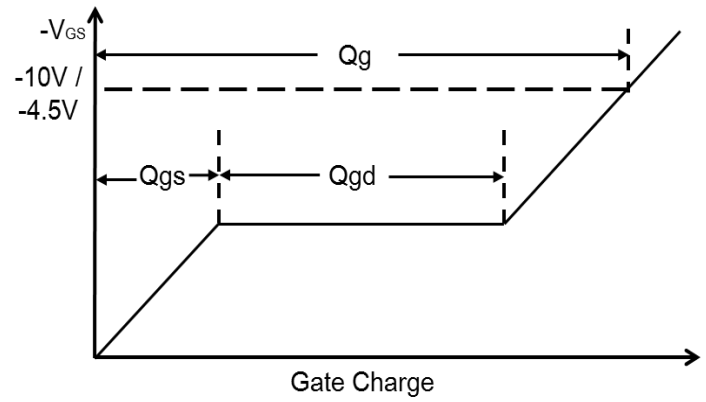
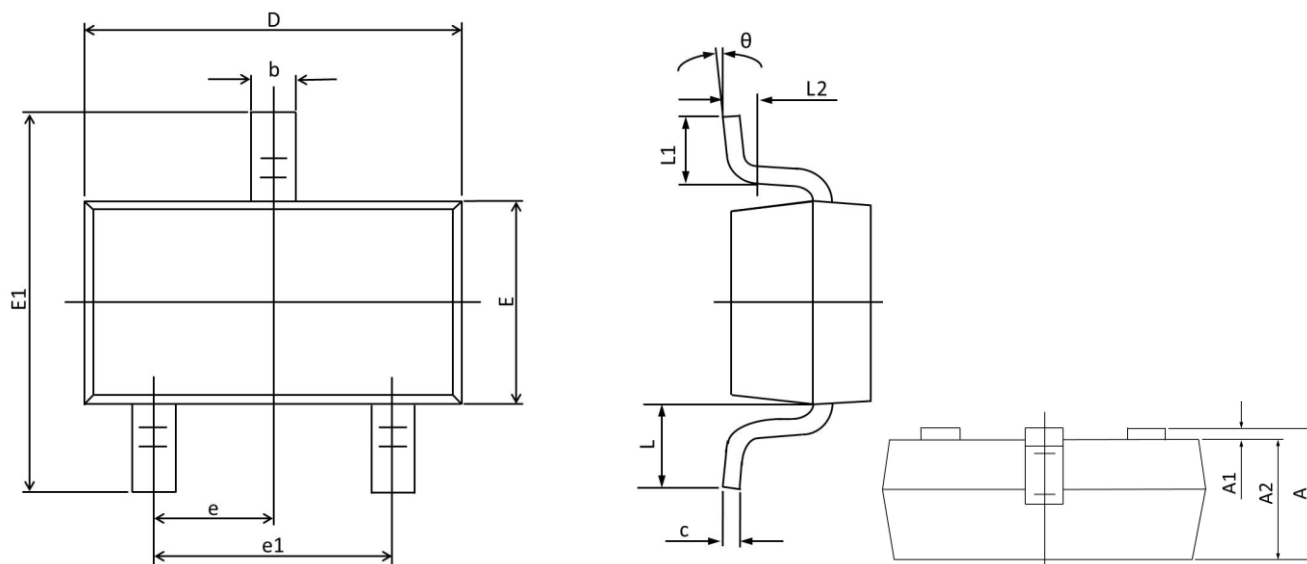


Fig.8 Gate Charge Waveform

## 20V N-Channel MOSFETs

### SOT-323 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
A1	0.100	0.000	0.004	0.000
A2	1.000	0.800	0.039	0.031
b	0.400	0.200	0.016	0.008
c	0.250	0.080	0.010	0.003
D	2.200	1.800	0.087	0.071
E	1.350	1.150	0.053	0.045
E1	2.450	1.800	0.096	0.071
e	0.65BSC		0.026BSC	
e1	1.400	1.200	0.055	0.047
L	0.525REF.		0.021REF.	
L1	0.460	0.150	0.018	0.006
L2	0.200	0.000	0.008	0.000
$\theta$	8°	0°	8°	0°