

## Small Signal MOSFET 380 mAmps, 60 Volts

### N-Channel SOT-23

#### Features

- ESD Protected
- Low  $R_{DS(on)}$
- Surface Mount Package
- This is a Pb-Free Device
- We declare that the material of product are Halogen Free and compliance with RoHS requirements.
- AEC-Q101 qualified

#### Applications

- Low Side Load Switch
- Level Shift Circuits
- DC-DC Converter
- Portable Applications i.e. DSC, PDA, Cell Phone, etc.

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

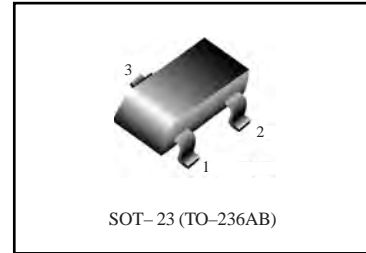
Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DS}$	60	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current (Note 1) Steady State	$I_D$	$T_A = 25^\circ\text{C}$	320
		$T_A = 85^\circ\text{C}$	230
		$T_A = 25^\circ\text{C}$	380
		$T_A = 85^\circ\text{C}$	270
Power Dissipation (Note 1) Steady State $t < 5\text{ s}$	$P_D$	300 420	mW
Pulsed Drain Current ( $t_p = 10\mu\text{s}$ )	$I_{DM}$	1.5	A
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode)	$I_S$	300	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10s)	$T_L$	260	$^\circ\text{C}$
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

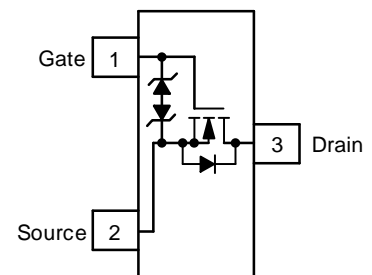
#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction-to-Ambient - $t \leq 5\text{ s}$ (Note 1)	$R_{\theta JA}$	300	

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

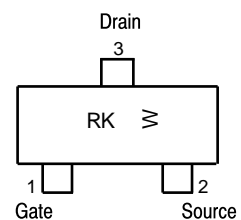


#### Simplified Schematic



(Top View)

#### MARKING DIAGRAM & PIN ASSIGNMENT



RK = Device Code  
W = Month Code

#### ORDERING INFORMATION

Device	Marking	Shipping
FTK7002K	RK	3000 Tape & Reel



# FTK7002K

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250μA	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			71		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 60V	T <sub>J</sub> = 25°C		1	μA
			T <sub>J</sub> = 125°C		500	
		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 50V	T <sub>J</sub> = 25°C			100
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20V			±10	μA

## ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA	1.0		2.5	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			4.0		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 500 mA			2.3	Ω
		V <sub>GS</sub> = 5.0 V, I <sub>D</sub> = 50 mA			2.7	
		V <sub>GS</sub> = 3.3 V, I <sub>D</sub> = 10 mA			10	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 200 mA	80			mS

## CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 25 V		34		pF
Output Capacitance	C <sub>OSS</sub>			3		
Reverse Transfer Capacitance	C <sub>RSS</sub>			2.2		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 10 V; I <sub>D</sub> = 500 mA		0.71		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			0.1		
Gate-to-Source Charge	Q <sub>GS</sub>			0.32		
Gate-to-Drain Charge	Q <sub>GD</sub>			0.16		

## SWITCHING CHARACTERISTICS, V<sub>GS</sub> = V (Note 3)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>DS</sub> = 10 V, V <sub>GEN</sub> = 10 V, I <sub>D</sub> = 500 mA		3.8		ns
Rise Time	t <sub>r</sub>			3.4		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			19		
Fall Time	t <sub>f</sub>			12		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 115 mA	T <sub>J</sub> = 25°C		1.4	V
			T <sub>J</sub> = 85°C		0.7	

- Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%
- Switching characteristics are independent of operating junction temperatures

## TYPICAL ELECTRICAL CHARACTERISTICS

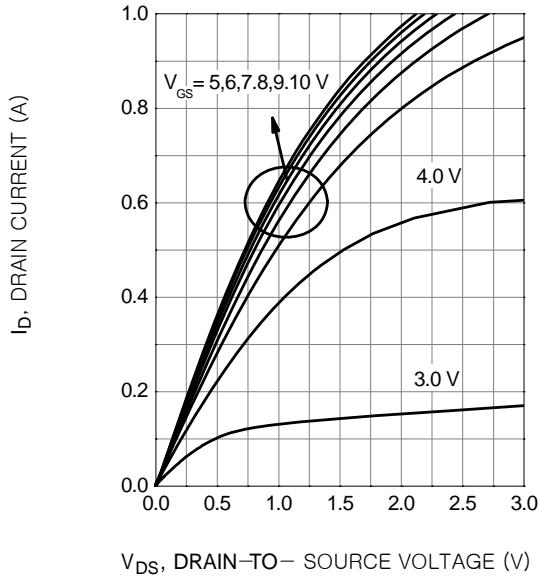


Figure 1. On-Region Characteristics

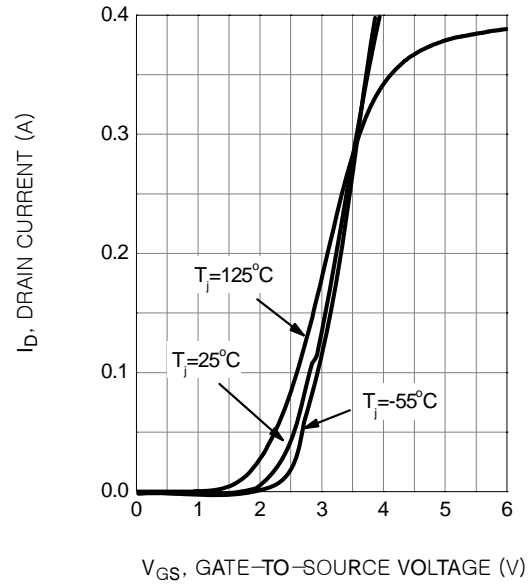


Figure 2. Transfer Characteristics

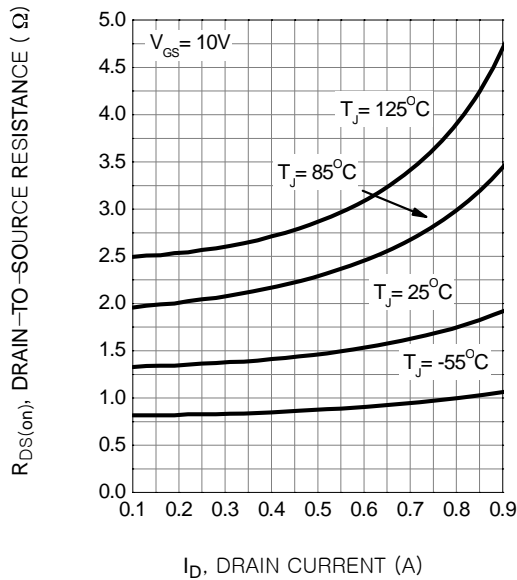


Figure 3. On-Resistance vs. Drain Current and Temperature

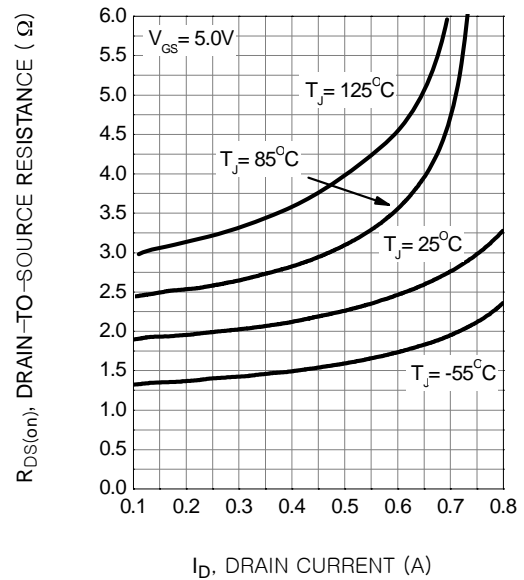


Figure 4. On-Resistance vs. Drain Current and Temperature

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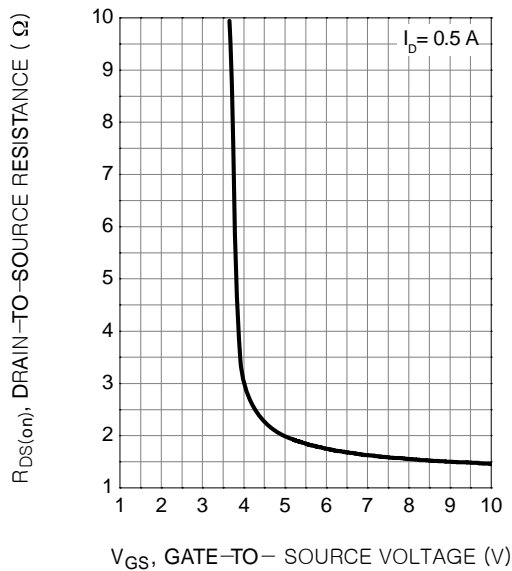


Figure 5. On-Resistance vs. Gate-to-Source Voltage

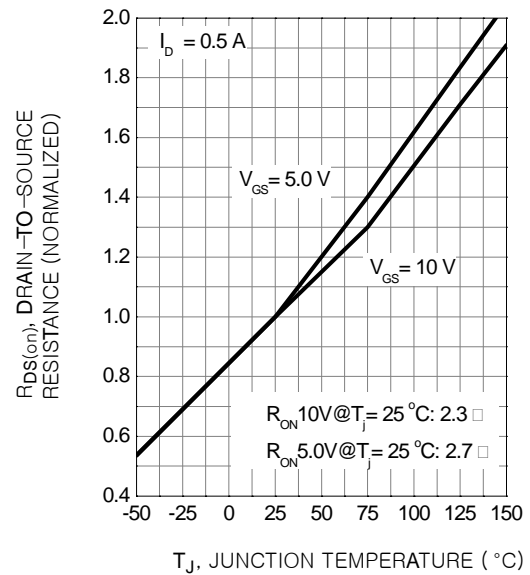


Figure 6. On-Resistance Variation with Temperature

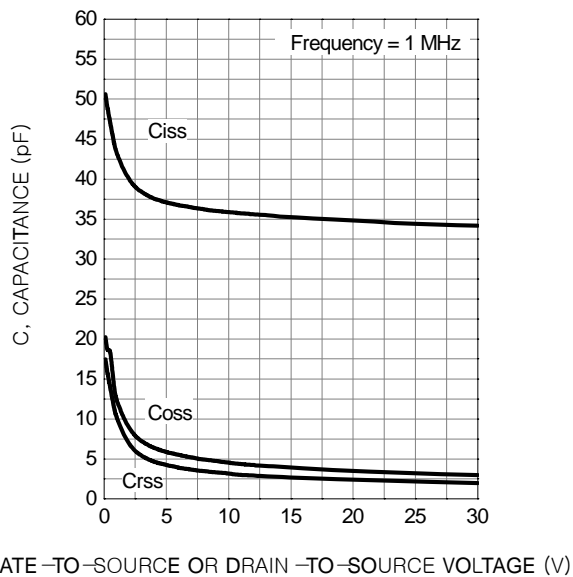


Figure 7. Capacitance Variation

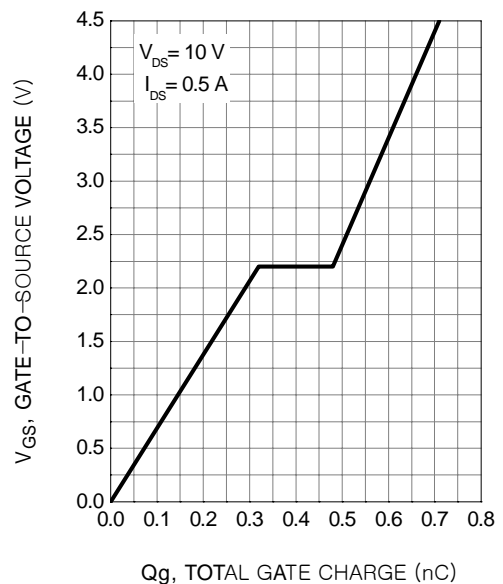
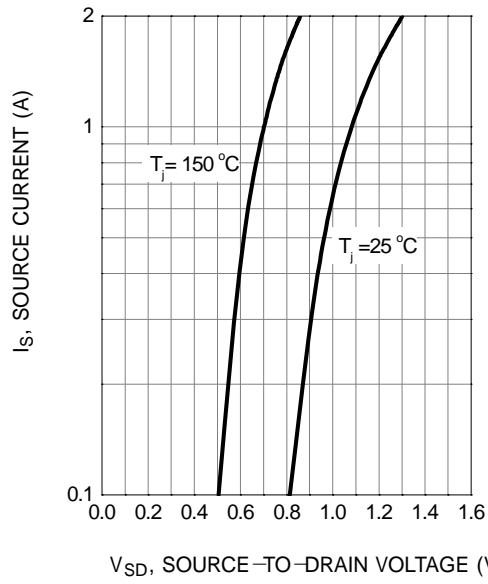


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

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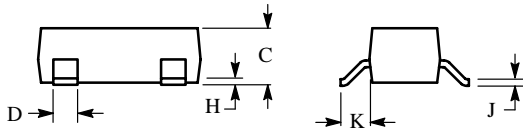
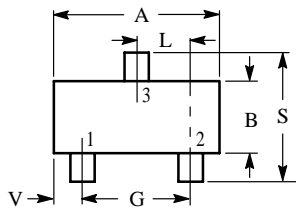


**Figure 9. Diode Forward Voltage vs. Current**

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### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,1982
2. CONTROLLING DIMENSION: INCH.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

