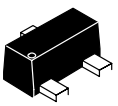
Small Signal MOSFET

20 V, 238 mA, Single, N- Channel, Gate ESD Protection

Features

- Low Gate Charge for Fast Switching
- Small 1.6 x 1.6 mm Footprint
- ESD Protected Gate
- Pb–Free Package is Available
- ESD Protected:2000V



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$V_{(BR)DSS}$	$R_{DS(on)}$ Typ @ V_{GS}	I_D MAX (Note 1)
20 V	1.5 Ω @ 4.5 V	238 mA
	2.2 Ω @ 2.5 V	

Applications

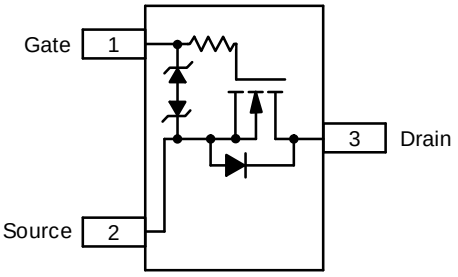
- Power Management Load Switch
- Level Shift
- Portable Applications such as Cell Phones, Media Players, Digital Cameras, PDA's, Video Games, Hand Held Computers, etc.

MAXIMUM RATINGS (TJ = 25℃ unless otherwise stated)

Parameter		Symbol	Value	Unit
Drain- to- Source Voltage		V_{DSS}	20	V
Gate- to- Source Voltage		V_{GS}	±10	V
Continuous Drain Current (Note 1)	Steady State = 25℃	I_D	238	mA
Power Dissipation (Note 1)	Steady State = 25℃	P_D	300	mW
Pulsed Drain Current	$t_P \leq 10\,\mu s$	I_{DM}	714	mA
Operating Junction and Storage Temperature		T_J, T_{STG}	- 55 to 150	°C
Continuous Source Current (Body Diode)		I_{SD}	238	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	°C

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.

PIN CONNECTIONS



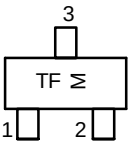
(Top View)

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction- to- Ambient – Steady State (Note 1)	$R_{\theta JA}$	416	°C/W

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

MARKING DIAGRAM



TF = Specific Device Code
M = Month Code

ORDERING INFORMATION

Device	Package	Shipping
FTK4001E	SOT- 523	3000 Tape & Reel

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100μA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 20 V			1.0	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±10 V			±100	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = 3 V, I_D = 100μA	0.5	1.0	1.5	V
Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 10 mA		1.5	3.0	Ω
		V_{GS} = 2.5 V, I_D = 10 mA		2.2	3.5	
Forward Transconductance	g_{FS}	V_{DS} = 3 V, I_D = 10 mA		50		mS
CAPACITANCES						
Input Capacitance	C_{ISS}	V_{DS} = 5 V, f = 1 MHz, V_{GS} = 0 V		11.5	20	pF
Output Capacitance	C_{OSS}			10	15	
Reverse Transfer Capacitance	C_{RSS}			3.5	6.0	
SWITCHING CHARACTERISTICS (Note 3)						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DS} = 5 V, I_D = 10 mA, R_G = 10Ω		13		ns
Rise Time	t_r			15		ns
Turn-Off Delay Time	$t_{d(OFF)}$			98		
Fall Time	t_f			60		
DRAIN-SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 mA		0.66	0.8	V

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

Typical Characteristics (T_A =25℃ Noted)

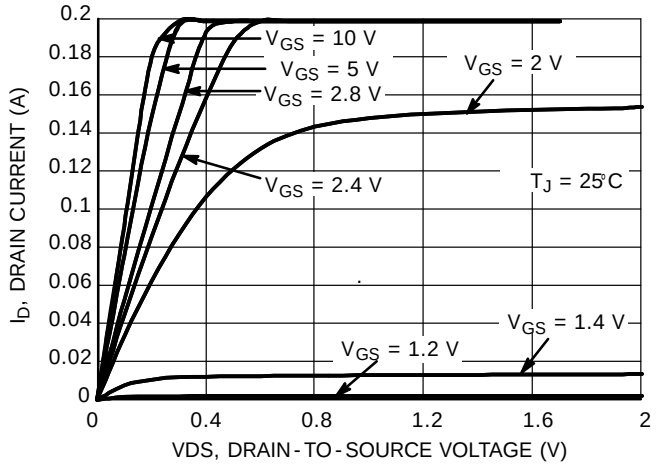


Figure 1. On-region Characteristics

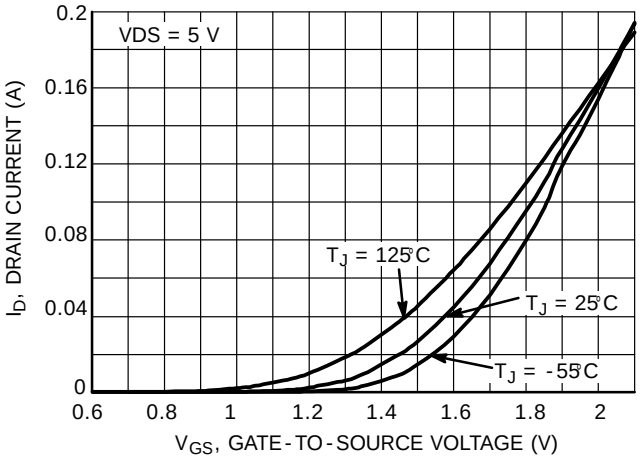


Figure 2. Transfer Characteristics

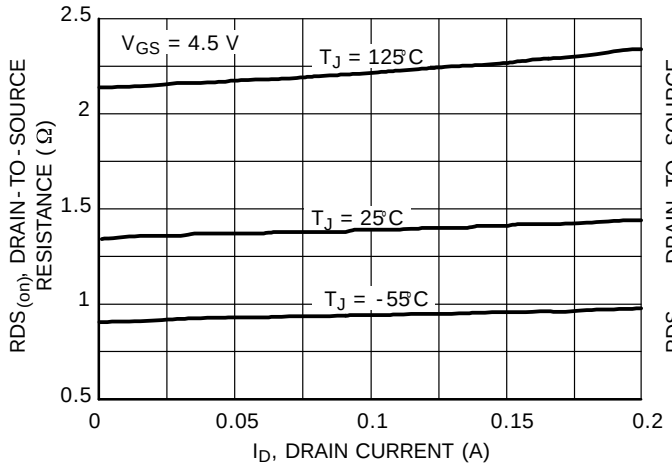


Figure 3. On-resistance versus Drain Current and Temperature

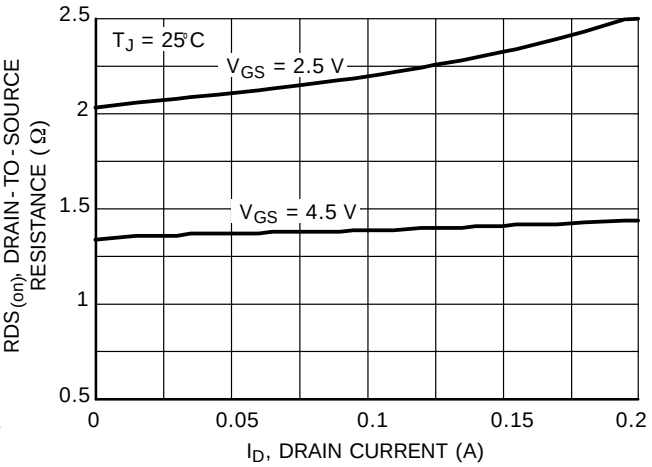


Figure 4. On-resistance versus Drain Current and Gate Voltage

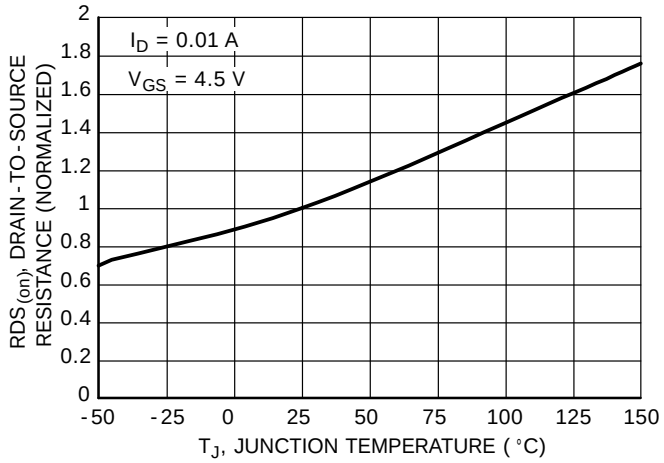


Figure 5. On-resistance Variation with Temperature

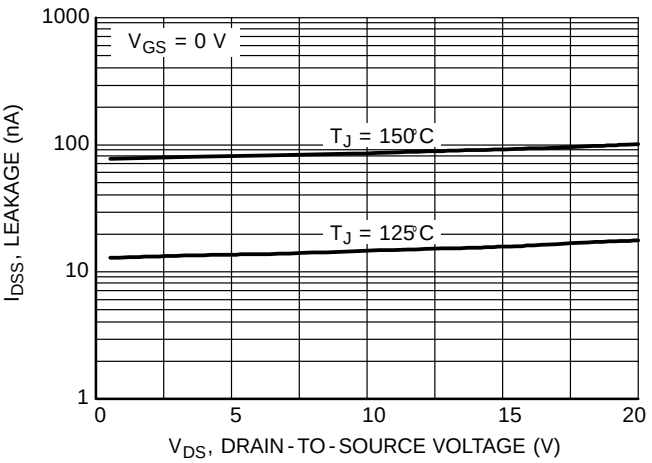


Figure 6. Drain-to-Source Leakage Current versus Voltage

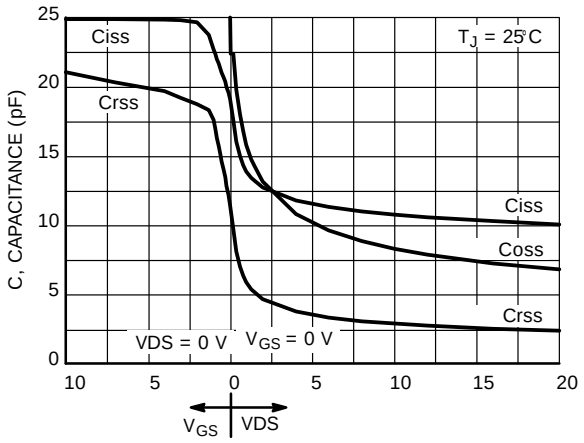


Figure 7. Capacitance Variation

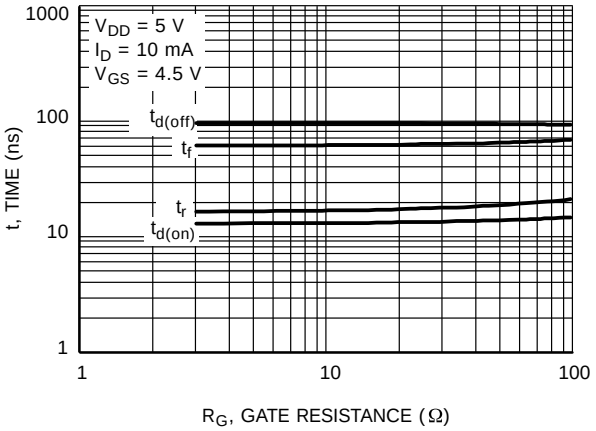


Figure 8. Resistive Switching Time Variation versus Gate Resistance

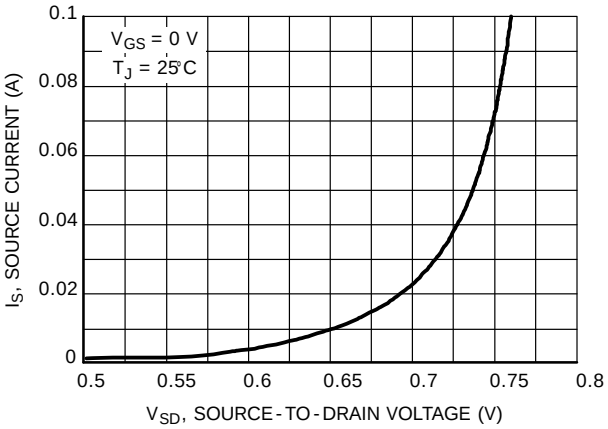


Figure 9. Diode Forward Voltage versus Current

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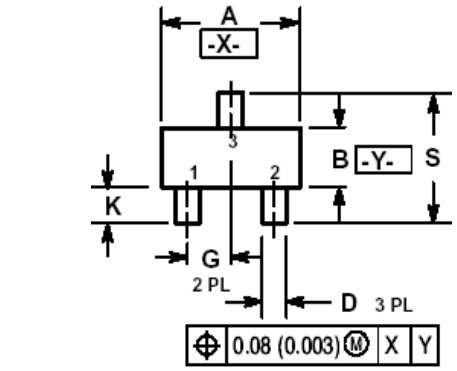

NOTES:
1.DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2.CONTROLLING DIMENSION: MILLIMETERS
3.MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4.463C-01 OBSOLETE, NEW STANDARD 463C-02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067