

## 20V N-Channel Enhancement-Mode MOSFET

### DESCRIPTION

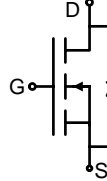
The FTK2302 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### GENERAL FEATURES

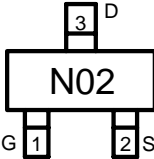
- $V_{DS} = 20V, I_D = 2.4A$   
 $R_{DS(ON)} < 115m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 60m\Omega @ V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### Application


- Battery protection
- Load switch
- Power management



**Schematic diagram**



**Marking and pin Assignment**



**SOT-23 top view**

- We declare that the material of product are Halogen Free and compliance with RoHS requirements.

### PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
N02	FTK2302	SOT-23	Ø180mm	8 mm	3000 units

### ABSOLUTE MAXIMUM RATINGS(TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±8	V
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_D (25^\circ C)$	2.4	A
	$I_D (70^\circ C)$	1.7	A
	$I_{DM}$	10	A
Maximum Power Dissipation	$P_D$	0.9	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	140	°C/W
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### ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 8V, V_{DS}=0V$			±100	nA
<b>ON CHARACTERISTICS (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.6	0.95	1.2	V

Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=3.1A$	70	115	$m\Omega$
		$V_{GS}=4.5V, I_D=3.6A$	45	60	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=3.6A$	8		S
<b>DYNAMIC CHARACTERISTICS (Note4)</b>					
Input Capacitance	$C_{ISS}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	300		PF
Output Capacitance	$C_{OSS}$		120		PF
Reverse Transfer Capacitance	$C_{RSS}$		80		PF
<b>SWITCHING CHARACTERISTICS (Note 4)</b>					
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L = 2.8 \Omega$ $V_{GS}=4.5V, R_{GEN}=6\Omega,$ $I_D=3.6A,$	7	15	nS
Turn-on Rise Time	$t_r$		55	80	nS
Turn-Off Delay Time	$t_{d(off)}$		16	60	nS
Turn-Off Fall Time	$t_f$		10	25	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=3.6A, V_{GS}=4.5V$	4.0	10	nC
Gate-Source Charge	$Q_{gs}$		0.65		nC
Gate-Drain Charge	$Q_{gd}$		1.5		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>					
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=0.94A$	0.76	1.2	V
Diode Forward Current (Note 2)	$I_S$		0.94		A

### NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on 1in<sup>2</sup> FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

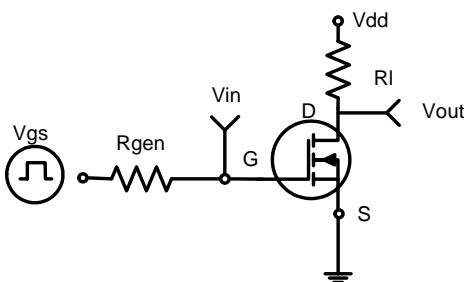


Figure 1: Switching Test Circuit

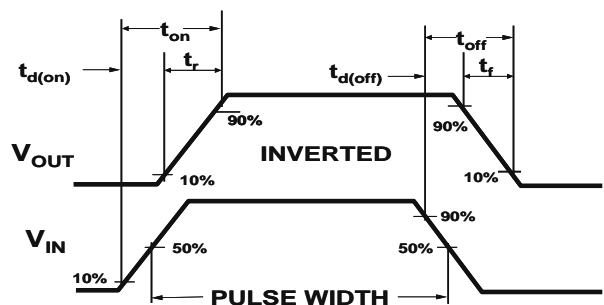
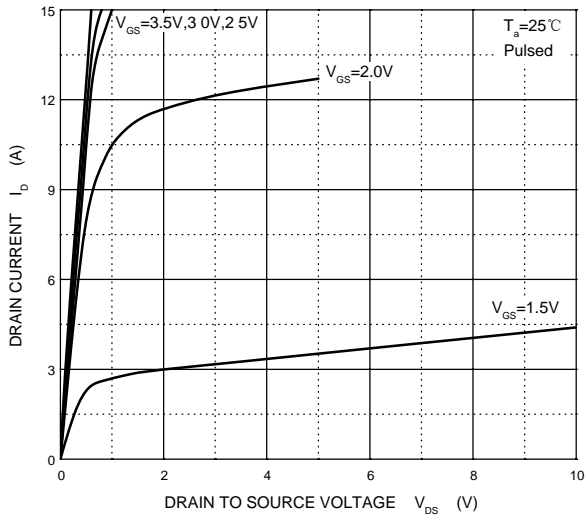
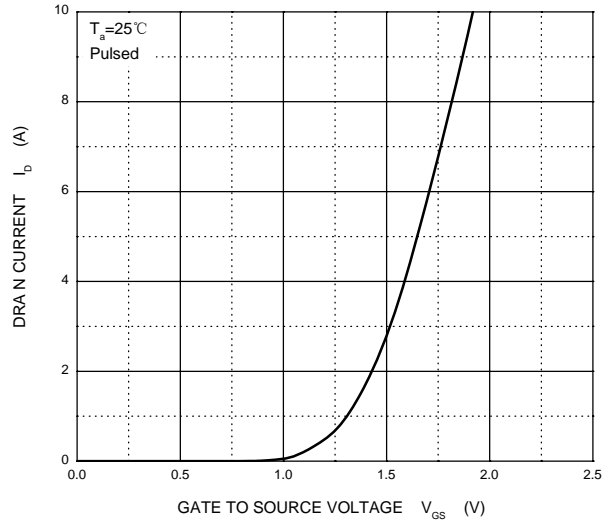


Figure 2: Switching Waveforms

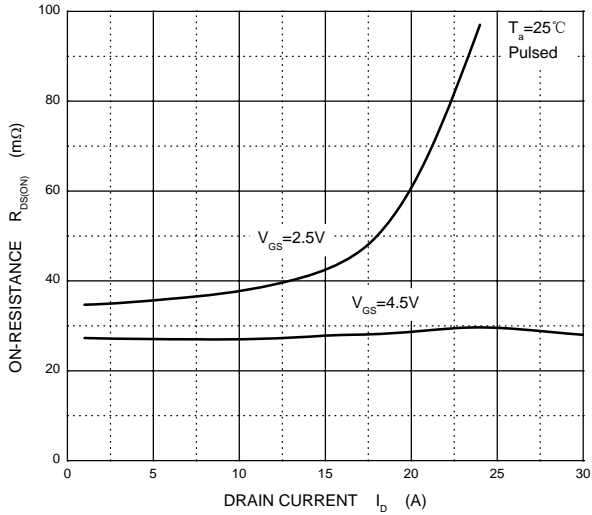
### Output Characteristics



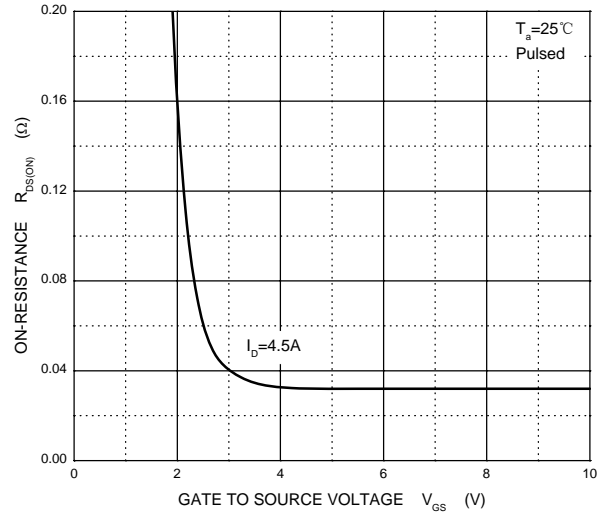
### Transfer Characteristics



### $R_{DS(ON)}$ — $I_D$



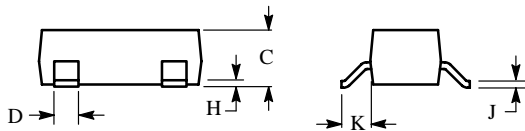
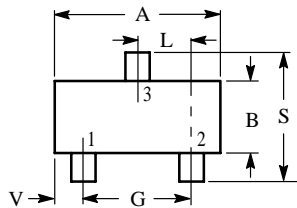
### $R_{DS(ON)}$ — $V_{GS}$



## SOT -23

### 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

