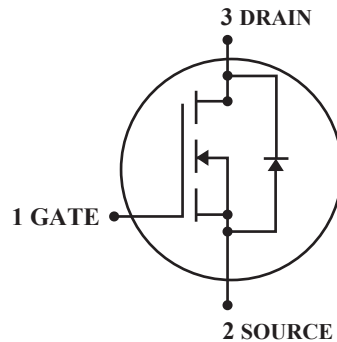


## N-Channel Enhancement Mode Power MOSFET

**(Pb)** Lead(Pb)-Free

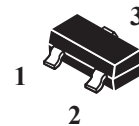


**DRAIN CURRENT**  
2.7 AMPERS

**DRAIN SOURCE VOLTAGE**  
25 VOLTAGE

### Features:

- \*Super High Dense Cell Design For Low  $R_{DS(ON)}$   
 $R_{DS(ON)} < 117m\Omega @ V_{GS}=10V$
- \*Rugged and Reliable



**SOT-23**

### Application:

- \*Capable of 2.5V Gate Drive
- \*Simple Drive Requirement
- \*SOT-23 Package

### Maximum Ratings ( $T_A=25^\circ C$ Unless Otherwise Specified)

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	
Continuous Drain Current <sup>3</sup> , $V_{GS}@4.5V(T_A=25^\circ C)$ $V_{GS}@4.5V(T_A=70^\circ C)$	$I_D$	3.2	A
		2.6	
Pulsed Drain Current <sup>1,2</sup>	$I_{DM}$	10	
Total Power Dissipation ( $T_A=25^\circ C$ )	$P_D$	1.38	W
Maximum Junction-ambient <sup>3</sup>	$R_{\theta JA}$	90	$^\circ C/W$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	$-55 \sim +150$	$^\circ C$

### Device Marking

WTC2302=2302

## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ Unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### Static

Drain-Source Breakdown Voltage $V_{GS}=0, I_D=250\mu\text{A}$	$V_{(BR)DSS}$	20	-	-	V
Gate-Source Threshold Voltage $V_{DS}=V_{GS}, I_D=250\mu\text{A}$	$V_{GS(Th)}$	0.5	-	1.2	
Gate-Source Leakage Current $V_{GS} = \pm 12\text{V}$	$I_{GSS}$	-	-	$\pm 100$	nA
Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ ) $V_{DS}=20\text{V}, V_{GS}=0$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Drain-Source Leakage Current ( $T_j=70^\circ\text{C}$ ) $V_{DS}=20\text{V}, V_{GS}=0$		-	-	10	
Drain-Source On-Resistance $V_{GS}=4.5\text{V}, I_D=3.6\text{A}$ $V_{GS}=2.5\text{V}, I_D=3.1\text{A}$	$R_{DS(on)}$	-	-	85 115	$\text{m}\Omega$
Forward Transconductance $V_{DS}=5\text{V}, I_D=3.6\text{A}$	$g_{fs}$	-	6	-	S

### Dynamic

Input Capacitance $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{iss}$	-	145	-	pF
Output Capacitance $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{oss}$	-	100	-	
Reverse Transfer Capacitance $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{rss}$	-	50	-	

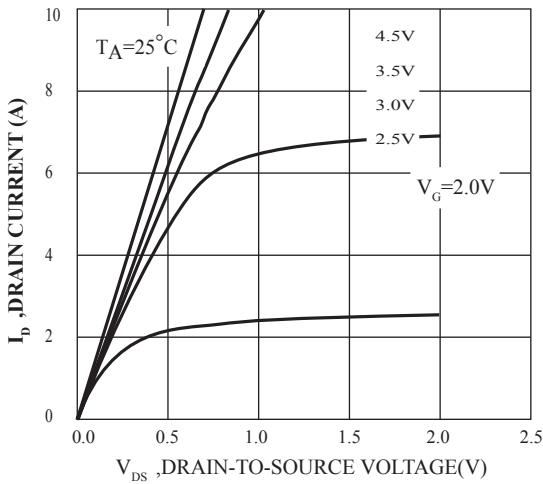
## Switching

Turn-on Delay Time <sup>2</sup> $V_{DS}=10V, V_{GS}=5V, I_D=3.6A, R_D=2.8\Omega, R_G=6\Omega$	$t_{d(on)}$	-	5.2	-	ns
Rise Time $V_{DS}=10V, V_{GS}=5V, I_D=3.6A, R_D=2.8\Omega, R_G=6\Omega$	$t_r$	-	37	-	
Turn-off Delay Time $V_{DS}=10V, V_{GS}=5V, I_D=3.6A, R_D=2.8\Omega, R_G=6\Omega$	$t_{d(off)}$	-	15	-	
Fall Time $V_{DS}=10V, V_{GS}=5V, I_D=3.6A, R_D=2.8\Omega, R_G=6\Omega$	$t_f$	-	5.7	-	
Total Gate Charge <sup>2</sup> $V_{DS}=10V, V_{GS}=4.5V, I_D=3.6A$	$Q_g$	-	4.4	-	nC
Gate-Source Charge $V_{DS}=10V, V_{GS}=4.5V, I_D=3.6A$	$Q_{gs}$	-	0.6	-	
Gate-Drain Change $V_{DS}=10V, V_{GS}=4.5V, I_D=3.6A$	$Q_{gd}$	-	1.9	-	

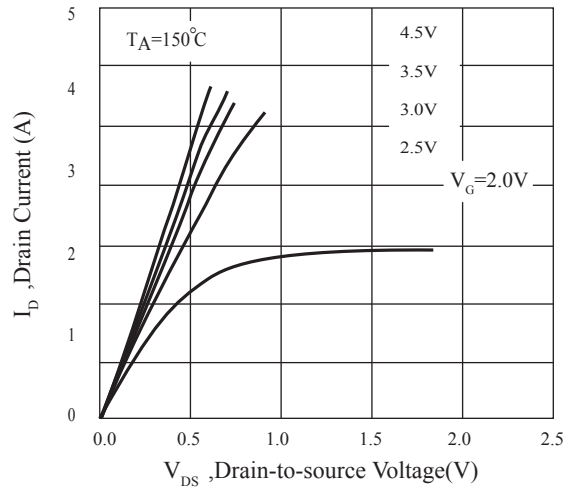
## Source-Drain Diode Characteristics

Forward On Voltage <sup>2</sup> $V_{GS}=0V, I_S=1.6A$	$V_{SD}$	-	-	1.2	V
Continuous Source Current(Body Diode) $V_D=V_G=0V, V_S=1.2V$	$I_S$	-	-	1	A
Pulsed Source Current(Body Diode) <sup>1</sup>	$I_{SM}$	-	-	10	A

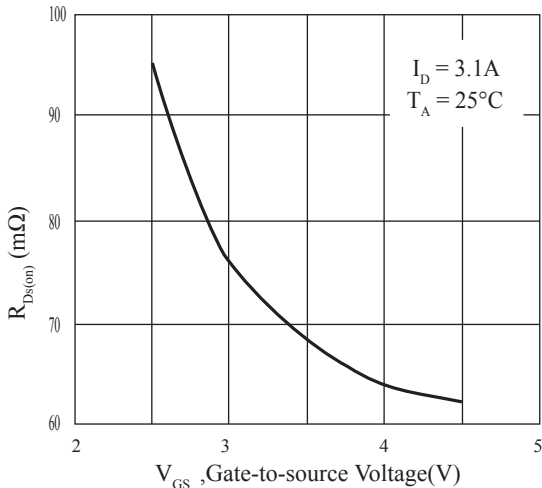
- Note: 1. Pulse width limited by Max, junction temperature.  
 2. pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .  
 3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board; 270°C/W when mounted on min, copper pad.



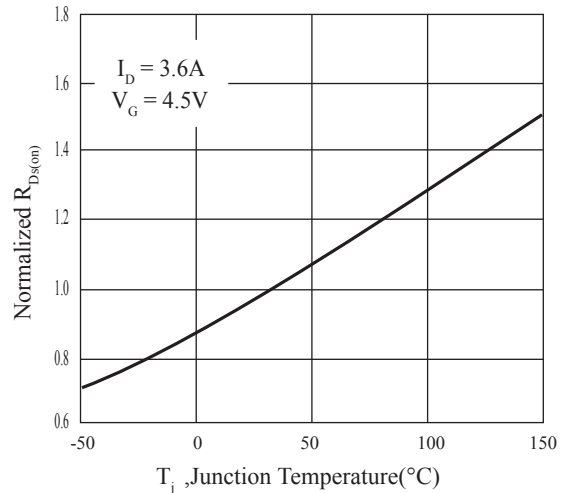
**FIG.1 Typical Output Characteristics**



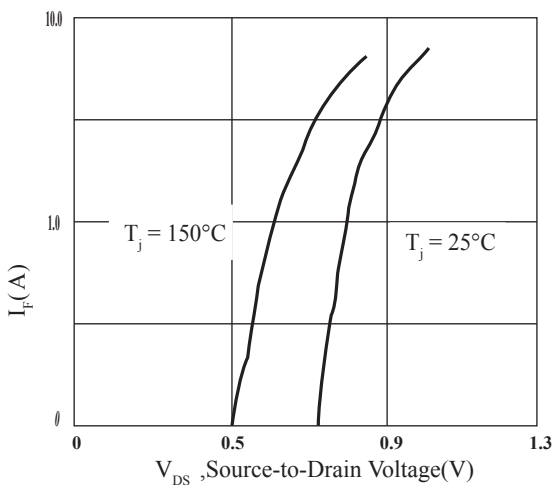
**Fig.2 Typical Output Characteristics**



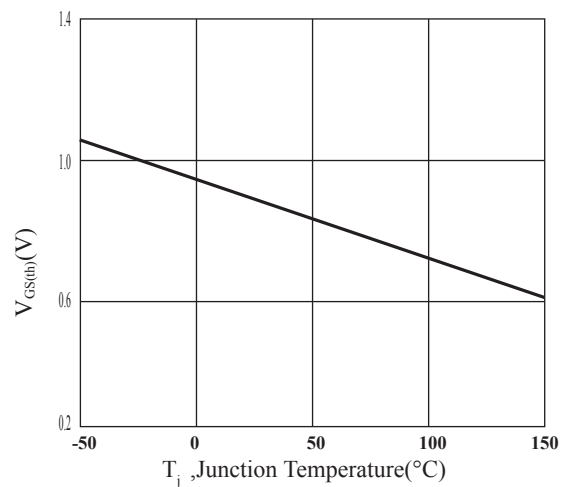
**Fig.3 On-Resistance v.s. Gate Voltage**



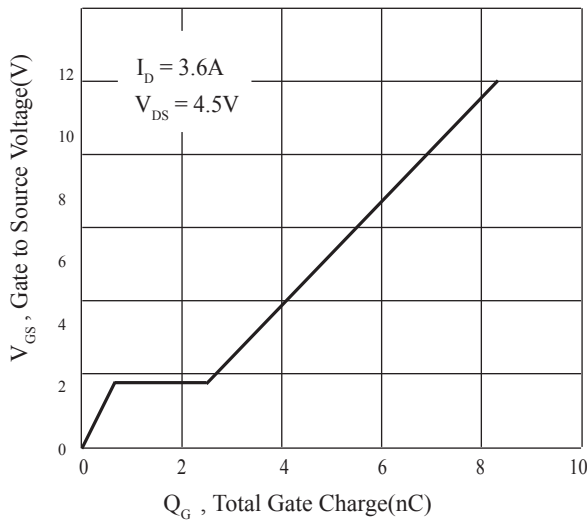
**Fig.4 Normalized OnResistance**



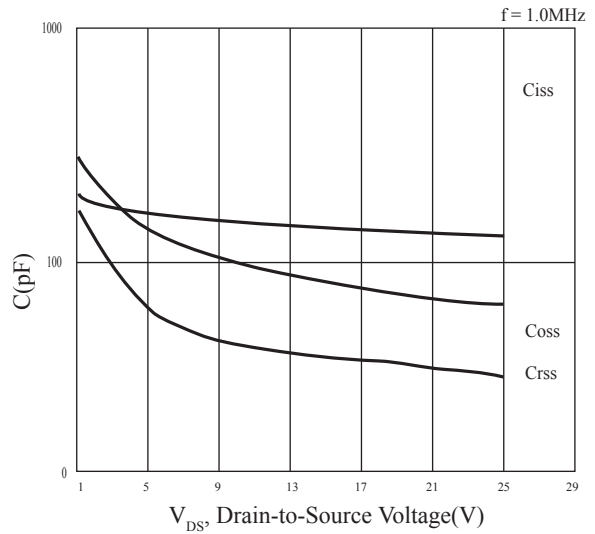
**Fig.5 Forward Characteristics of Reverse Diode**



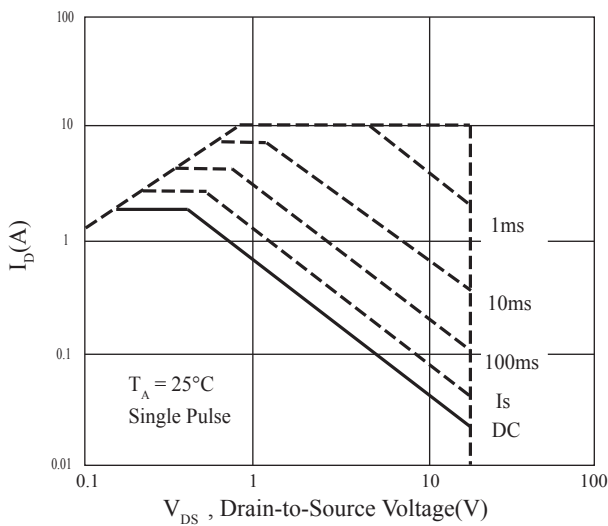
**Fig.6 Gate Threshold Voltage v.s. Junction Temperature**



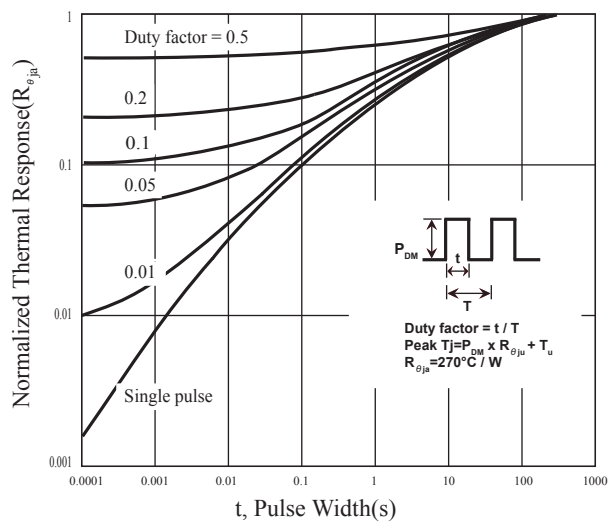
**Fig 7. Gate Charge Characteristics**



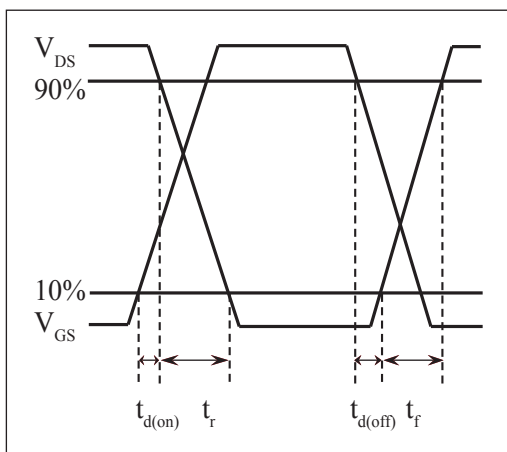
**Fig 8. Typical Capacitance Characteristics**



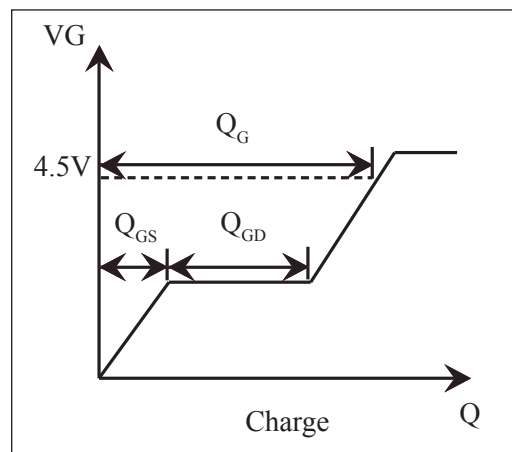
**Fig 9. Maximum Safe Operation Area**



**Fig 10. Effective Transient Thermal Impedance**

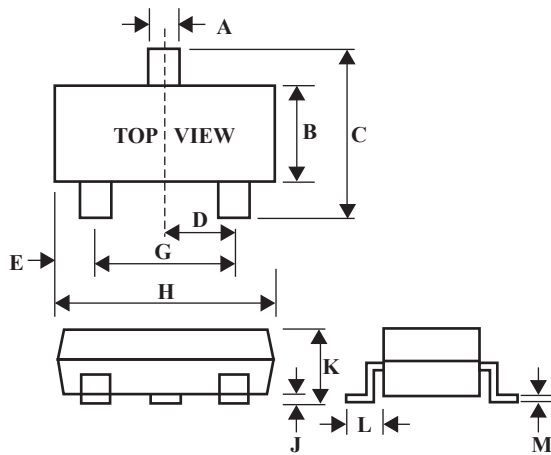


**Fig 11. Switching Time Circuit**



**Fig 12. Gate Charge Waveform**

**SOT-23 Outline Dimension**



<b>SOT-23</b>		
<b>Dim</b>	<b>Min</b>	<b>Max</b>
<b>A</b>	0.35	0.51
<b>B</b>	1.19	1.40
<b>C</b>	2.10	3.00
<b>D</b>	0.85	1.05
<b>E</b>	0.46	1.00
<b>G</b>	1.70	2.10
<b>H</b>	2.70	3.10
<b>J</b>	0.01	0.13
<b>K</b>	0.89	1.10
<b>L</b>	0.30	0.61
<b>M</b>	0.076	0.25