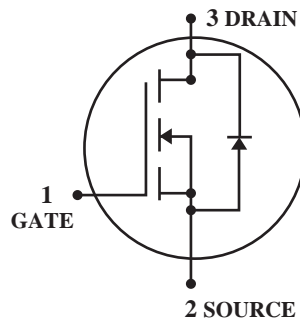


## N-Channel Enhancement Mode Power MOSFET

 Lead(Pb)-Free



**DRAIN CURRENT**  
3.2 AMPERES

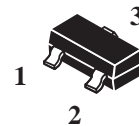
**DRAIN SOURCE VOLTAGE**  
20 VOLTAGE

### Features:

- \* Leading Planar Technology for Low Gate Charge / Fast Switching.
- \* 2.5V Rated for Low Voltage Gate Drive.
- \* SOT-23 Surface Mount for Small Footprint.

### Applications:

- \* Load/Power Switch for Portables.
- \* Load/Power Switch for Computing.
- \* DC-DC Conversion.



**SOT-23**

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

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$I_D$	$T_A=25^{\circ}\text{C}$ 3.2 $T_A=85^{\circ}\text{C}$ 2.4	A
Pulsed Drain Current	$I_{DM}$	$t_p=10\mu\text{S}$ 10	A
Continuous Source Current (Body Diode)	$I_S$	1.6	A
Total Power Dissipation ( $T_A=25^{\circ}\text{C}$ )	$P_D$	1.25	W
Maximum Junction-Ambient <sup>1,2</sup>	$R_{\theta JA}$	100 300	$^{\circ}\text{C}/\text{W}$
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260 $^{\circ}$	$^{\circ}\text{C}$
Operating Junction Temperature Range	$T_J$	-55~+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	-55~+150	$^{\circ}\text{C}$

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

2. Surface-mounted on FR4 board using the minimum recommended pad size.

## Device Marking

WTC4501 = N45

### Electrical Characteristics ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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#### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (Note 3)	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	20	24.5		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			22		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$			1.5	$\mu\text{A}$
		$V_{DS} = 16\text{ V}, T_J = 85^\circ\text{C}$			10	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA

#### ON CHARACTERISTICS

Gate Threshold Voltage (Note 3)	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.65		1.2	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-2.3		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 3.6\text{ A}$		70	80	m $\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 3.1\text{ A}$		85	105	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5.0\text{ V}, I_D = 3.6\text{ A}$		9		S

#### CHARGES AND CAPACITANCES

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 10\text{ V}$		200		pF
Output Capacitance	$C_{oss}$			80		
Reverse Transfer Capacitance	$C_{rss}$			50		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 3.6\text{ A}$		2.4	6.0	nC
Gate-to-Source Gate Charge	$Q_{GS}$			0.5		
Gate-to-Drain Charge	$Q_{GD}$			0.6		

#### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 3.6\text{ A}, R_G = 6.0\ \Omega$		6.5		ns
Rise Time	$t_r$			12		
Turn-Off Delay Time	$t_{d(off)}$			12		
Fall Time	$t_f$			3		

#### SOURCE-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_{SD} = 1.6\text{ A}$		0.8	1.2	V
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 1.6\text{ A}$		7.1		ns
Charge Time	$t_a$			5		
Discharge Time	$t_b$			1.9		
Reverse Recovery Charge	$Q_{RR}$			3.0		nC

3. Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

4. Switching characteristics are independent of operating junction temperatures.

## TYPICAL ELECTRICAL CHARACTERISTICS

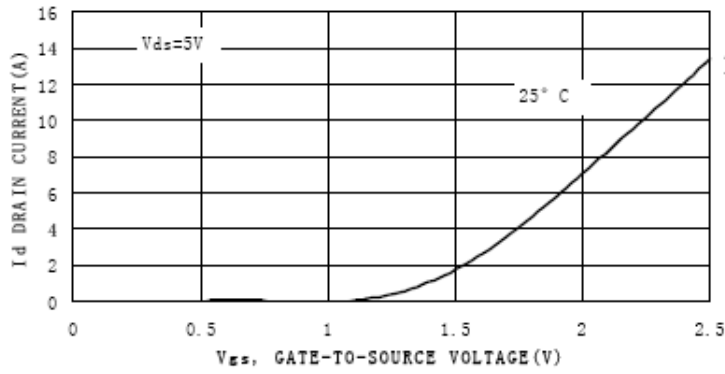


Figure 1. Transfer Characteristics

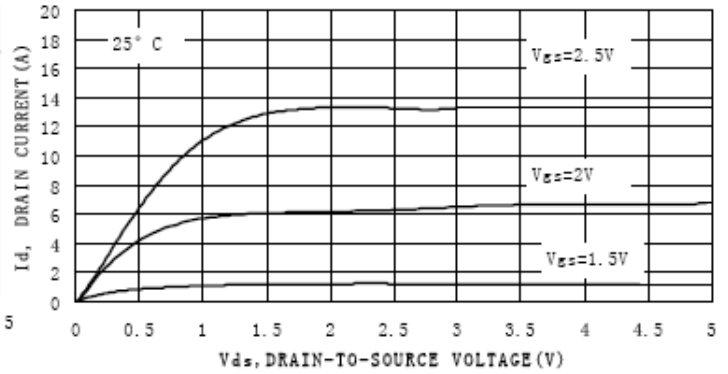


Figure 2. On-Region Characteristics

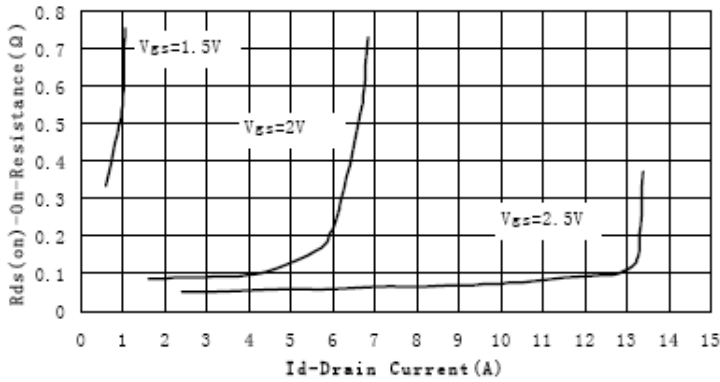


Figure 3. On-Resistance versus Drain Current

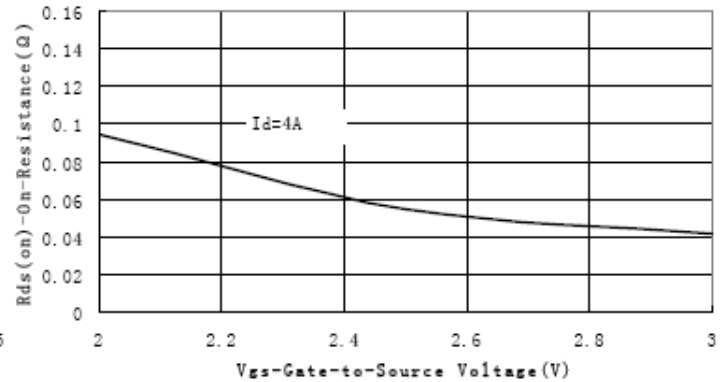


Figure 4. On-Resistance vs. Gate-to-Source Voltage

### SOT-23 Outline Dimension

