

**Surface Mount N-Channel Power MOSFET**
**(Pb)** Lead(Pb)-Free

**Features:**

- \* Enables High Density PCB Manufacturing
- \* 44% Smaller Footprint than SC-89 and 38% Thinner than SC-89
- \* Low Voltage Drive Makes this Device Ideal for Portable Equipment
- \* Low Threshold Levels,  $V_{GS(TH)} < 1.3$  V
- \* Low Profile ( $< 0.5$  mm) Allows It to Fit Easily into Extremely Thin Environments such as Portable Electronics
- \* Operated at Standard Logic Level Gate Drive, Facilitating Future Migration to Lower Levels Using the Same Basic Topology
- \* These are Pb-Free Devices

**Applications:**

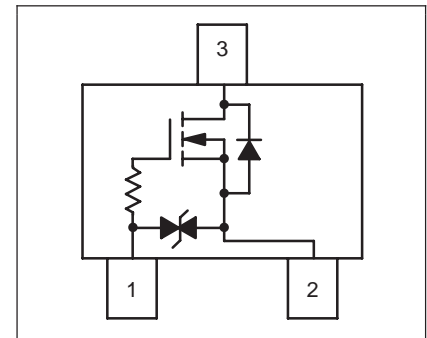
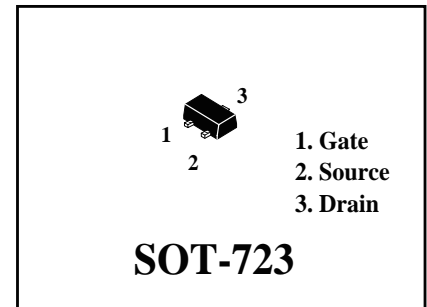
- \* Interfacing, Switching
- \* High Speed Switching
- \* Cellular Phones, PDAs

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

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 10$	
Continuous Drain Current (Note 1)	Steady State $T_A=25^\circ\text{C}$ $T_A=85^\circ\text{C}$ $t \leq 5\text{s}$ $T_A=25^\circ\text{C}$	255	mA
		185	
Power Dissipation (Note 1)	Steady State $T_A=25^\circ\text{C}$ $t \leq 5\text{s}$ $T_A=25^\circ\text{C}$	440	mW
		545	
Continuous Drain Current (Note 2)	Steady State $T_A=25^\circ\text{C}$ $T_A=85^\circ\text{C}$	210	mA
		155	
Power Dissipation (Note 2)	Steady State $T_A=25^\circ\text{C}$	310	mW
Pulsed Drain Current	$t_p=10\mu\text{s}$	400	mA
Source Current (Body Diode) (Note 2)		286	mA
Lead temperature for soldering purposes, 1/8" from case for 10 seconds	$T_L$	260	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ\text{C}$

\* 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.

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.



**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 @ $V_{GS}=0, I_D=100\mu\text{A}$	$V_{(BR)DSS}$	20	-	-	V
Gate Threshold Voltage @ $V_{DS}=V_{GS}, I_D=250\mu\text{A}$	$V_{GS(Th)}$	0.4	-	1.3	
Gate Threshold Temperature Coefficient @ $V_{DS}=V_{GS}, I_D=250\mu\text{A}$	$\frac{V_{GS(Th)}}{T_J}$	-	-2.4	-	$\text{mV}/^\circ\text{C}$
Gate-Source Leakage current Forward@ $V_{GS}=5\text{V}, V_{DS}=0\text{V}$ ReVerse@ $V_{GS}=-5\text{V}, V_{DS}=0\text{V}$	$I_{GSS}$	-	-	1	$\mu\text{A}$
Zero Gate Voltage Drain Current @ $V_{DS}=16\text{V}, V_{GS}=0$ ( $T_j=25^\circ\text{C}$ ) @ $V_{DS}=16\text{V}, V_{GS}=0$ ( $T_j=125^\circ\text{C}$ )	$I_{DSS}$	-	-	1 10	$\mu\text{A}$
Drain-Source On-State Resistance @ $V_{GS}=4.5\text{V}, I_D=10\text{mA}$ @ $V_{GS}=4.5\text{V}, I_D=255\text{mA}$ @ $V_{GS}=2.5\text{V}, I_D=1\text{mA}$ @ $V_{GS}=1.8\text{V}, I_D=1\text{mA}$ @ $V_{GS}=1.65\text{V}, I_D=1\text{mA}$	$R_{DS(on)}$	-	1.5 1.6 2.4 5.1 6.8	3.4 3.8 4.5 10 15	$\Omega$
Forward Transconductance @ $V_{DS}=5\text{V}, I_D=100\text{mA}$	$g_{fs}$	-	0.275	-	S
Drain-Source Breakdown Voltage Temperature Coefficient $I_D=100\mu\text{A}$ , Referenced to $25^\circ\text{C}$	$\frac{V_{(BR)DSS}}{T_J}$	-	27	-	$\text{mV}/^\circ\text{C}$

**Dynamic**

Input Capacitance @ $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{iss}$	-	11	-	pF
Output Capacitance @ $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{oss}$	-	8.3	-	
Reverse Transfer Capacitance @ $V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1.0\text{MHz}$	$C_{rss}$	-	2.7	-	

**Switching**

Turn-on Delay Time $V_{GS}=4.5\text{V}, V_{DD}=5\text{V}, I_D=10\text{mA}, R_G=6\Omega$ (Note 4)	$t_{d(on)}$	-	13	-	ns
Turn-on Rise Time $V_{GS}=4.5\text{V}, V_{DD}=5\text{V}, I_D=10\text{mA}, R_G=6\Omega$ (Note 4)	$t_r$	-	15	-	
Turn-off Delay Time $V_{GS}=4.5\text{V}, V_{DD}=5\text{V}, I_D=10\text{mA}, R_G=6\Omega$ (Note 4)	$t_{d(off)}$	-	94	-	
Turn-off Fall Time $V_{GS}=4.5\text{V}, V_{DD}=5\text{V}, I_D=10\text{mA}, R_G=6\Omega$ (Note 4)	$t_f$	-	55	-	

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

Characteristic	Symbol	Min	Typ	Max	Unit
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**Source-Drain Diode Characteristics**

Forward Diode Voltage @ $V_{GS}=0V, I_S=286mA$ $T_J=25^\circ\text{C}$ @ $V_{GS}=0V, I_S=286mA$ $T_J=125^\circ\text{C}$	$V_{SD}$	- -	0.83 0.69	1.2 -	V
Charge Time @ $V_{DD}=20V, V_{GS}=0V, I_S=286mA, dI_{SD}/dt=100A/\mu\text{s}$	$t_a$	-	7.1	-	ns
Discharge Time @ $V_{DD}=20V, V_{GS}=0V, I_S=286mA, dI_{SD}/dt=100A/\mu\text{s}$	$t_b$	-	2.0	-	
Reverse Recovery Time @ $V_{DD}=20V, V_{GS}=0V, I_S=286mA, dI_{SD}/dt=100A/\mu\text{s}$	$T_{rr}$	-	9.1	-	
Reverse Recovery Charge @ $V_{DD}=20V, V_{GS}=0V, I_S=286mA, dI_{SD}/dt=100A/\mu\text{s}$	$Q_{rr}$	-	3.7	-	nC

**Thermal Data**

Characteristic	Symbol	Value	Unit
Junction-to-Ambient Steady State (Note 3)	$R_{\theta JA}$	280	$^\circ\text{C}/\text{W}$
Junction-to-Ambient $t = 5\text{s}$ (Note 3)	$R_{\theta JA}$	228	
Junction-to-Ambient Steady State Minimum Pad (Note 4)	$R_{\theta JA}$	400	

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

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

**Device Marking**

WTG3043 = KA

## Typical Characteristics

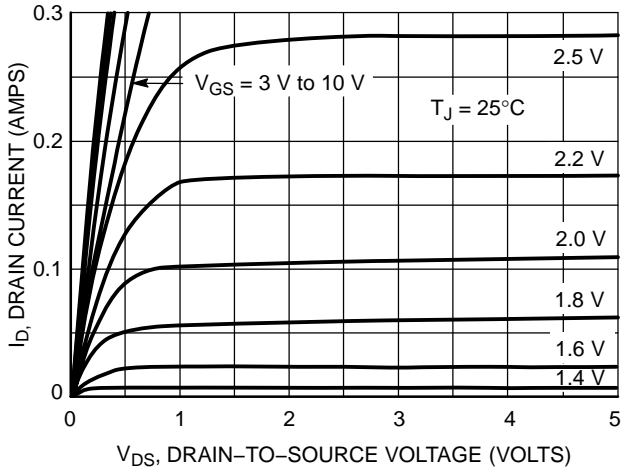


Figure 1. On-Region Characteristics

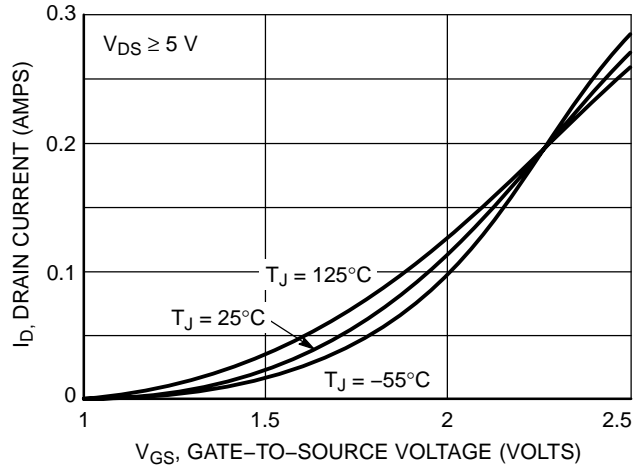


Figure 2. Transfer Characteristics

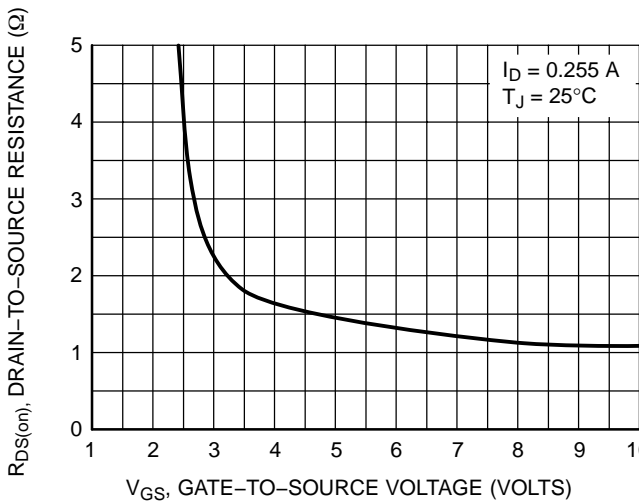


Figure 3. On-Resistance vs. Gate-to-Source Voltage

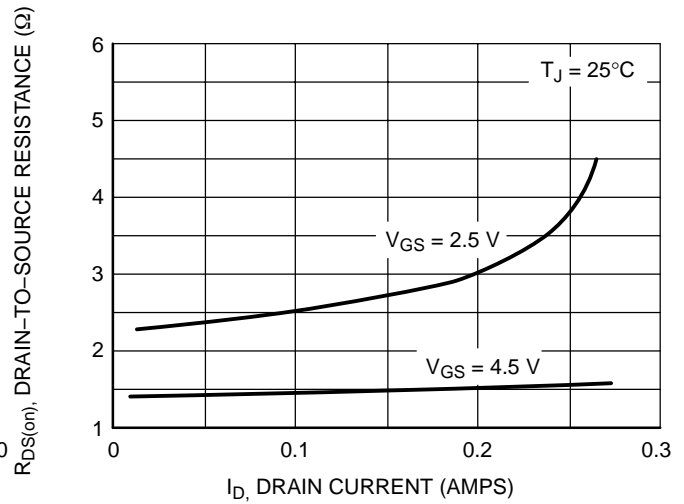


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

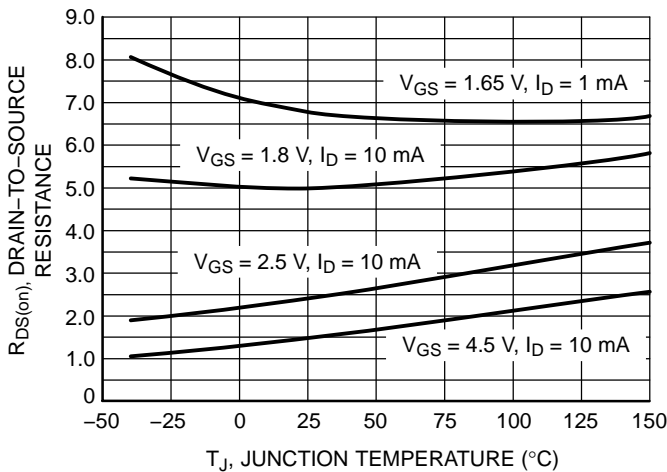


Figure 5. On-Resistance Variation with Temperature

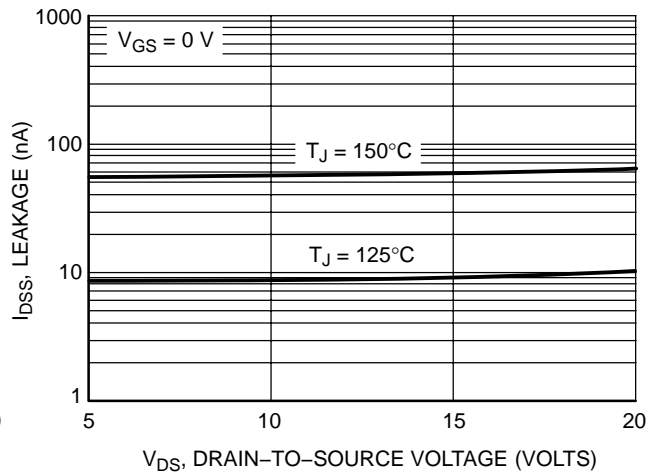


Figure 6. Drain-to-Source Leakage Current vs. Voltage

## Typical Characteristics

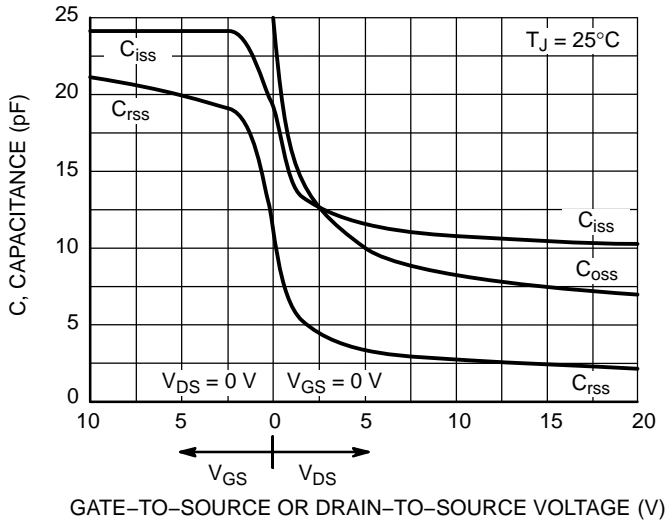


Figure 7. Capacitance Variation

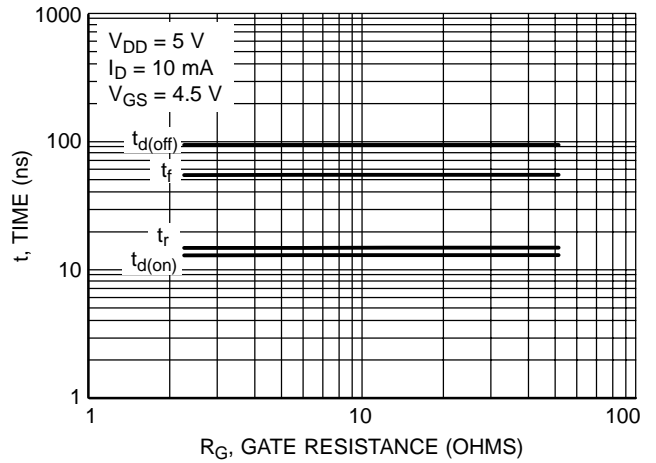


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

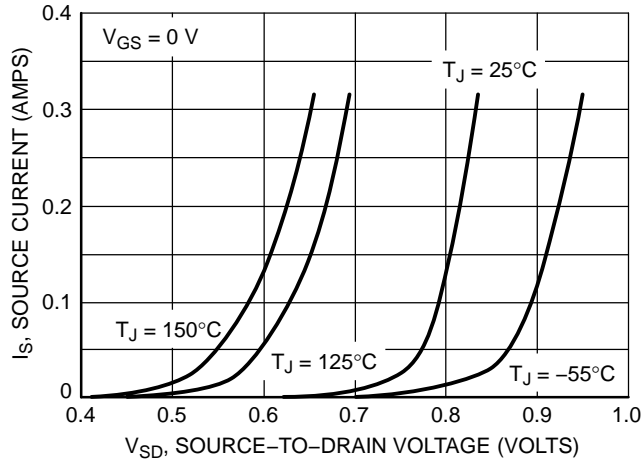
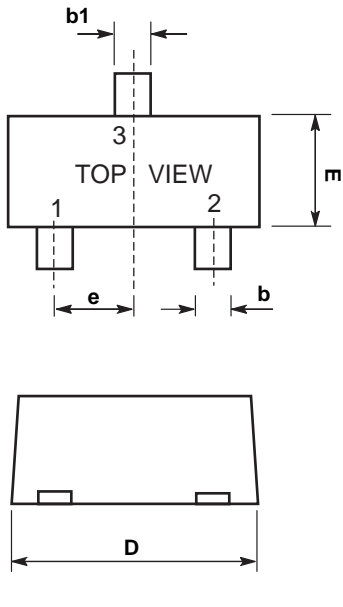


Figure 9. Diode Forward Voltage vs. Current

**SOT-723 Outline Demensions**

Unit:mm



SOT-723			
Dim	Min	Nom	Max
A	0.45	0.50	0.55
b	0.15	0.20	0.27
b1	0.25	0.3	0.35
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H <sub>E</sub>	1.15	1.20	1.25
L	0.15	0.20	0.25

**SOLDERING FOOTPRINT**

Unit:mm

