

RoHS Compliant Product  
A Suffix of "-C" specifies halogen & lead-free

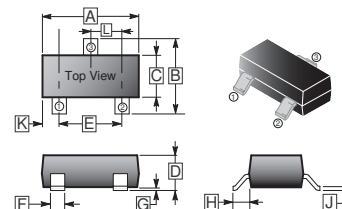
**SOT-23**

## FEATURES

- Low gate voltage threshold  $V_{GS(TH)}$  to facilitate drive circuit design
- Low gate charge for fast switching
- ESD protected gate
- Minimum breakdown voltage rating of 30V

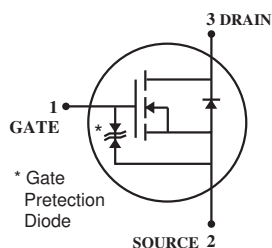
## APPLICATION

- Level shifters
- Level switches
- Low side load switches
- Portable applications



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.04	G	-	0.18
B	2.10	2.80	H	0.40	0.60
C	1.20	1.60	J	0.08	0.20
D	0.89	1.40	K	0.6 REF.	
E	1.78	2.04	L	0.85	1.15
F	0.30	0.50			

## DEVICE MARKING: TR8



## MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT
Drain – Source Voltage	$V_{DS}$	30	V
Gate – Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>1</sup> , Steady State	$I_D$	$T_A=25^\circ\text{C}$ 0.5	A
		$T_A=85^\circ\text{C}$ 0.37	
Power Dissipation <sup>1</sup> , Steady State	$P_D$	0.69	W
Continuous Drain Current <sup>1</sup> , $t < 10\text{s}$	$I_D$	$T_A=25^\circ\text{C}$ 0.56	A
		$T_A=85^\circ\text{C}$ 0.40	
Power Dissipation <sup>1</sup> , $t < 5\text{s}$	$P_D$	0.83	W
Pulsed Drain Current	$I_{DM}$	1.7	A
Maximum Junction – Ambient	$R_{\theta JA}$	Steady State <sup>1</sup>	180
		$t < 10\text{s}$ <sup>1</sup>	150
		Steady State <sup>2</sup>	300
Operating Junction & Storage Temperature Range	$T_J, T_{STG}$	150, -55~150	$^\circ\text{C}$
Source Current (Body Diode)	$I_S$	1.0	A
Lead Temperature for Soldering Purposes(1/8" from case 10s)	$T_L$	260	$^\circ\text{C}$

### Note:

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.

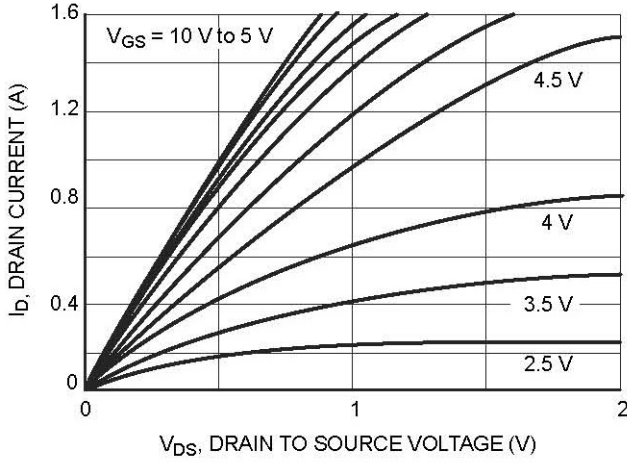
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	
<b>STATIC CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	30	-	-	V	$V_{GS}=0V, I_D=100\mu A$	
Gate-Source Threshold Voltage <sup>3</sup>	$V_{GS(TH)}$	0.8	-	1.6	V	$V_{DS}=V_{GS}, I_D=250\mu A$	
Gate-Source Leakage Current	$I_{GSS}$	-	-	$\pm 1.0$	$\mu A$	$V_{GS}=\pm 10V$	
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	1.0	$\mu A$	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	
Drain-Source On-Resistance <sup>3</sup>	$R_{DS(ON)}$	-	1.5	2.0	$\Omega$	$V_{GS}=2.5V, I_D=10mA$	
		-	1.0	1.5		$V_{GS}=4.0V, I_D=10mA$	
Forward Transconductance <sup>3</sup>	$g_{FS}$	-	0.33	-	S	$V_{DS}=3V, I_D=10mA$	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance	$C_{ISS}$	-	21	-	pF	$V_{DS}=5V$ $V_{GS}=0V$ $f=1MHz$	
Output Capacitance	$C_{OSS}$	-	19.7	-			
Reverse Transfer Capacitance	$C_{RSS}$	-	8.1	-			
<b>SWITCHING CHARACTERISTICS</b>							
Turn-on Delay Time <sup>4</sup>	$T_{d(ON)}$	-	16.7	-	nS	$V_{GS}=4.5V$ $V_{DD}=5V$ $I_D=0.1A$ $R_G=50\Omega$	
Rise Time <sup>4</sup>	$T_R$	-	47.9	-			
Turn-off Delay Time <sup>4</sup>	$T_{d(OFF)}$	-	65.1	-			
Fall Time <sup>4</sup>	$T_F$	-	64.2	-			
Total Gate Charge	$Q_G$	-	1.15	-	nC	$V_{GS}=5V$ $V_{DS}=24V$ $I_D=0.1A$	
Threshold Gate Charge	$Q_{G(TH)}$	-	0.15	-			
Gate-Source Charge	$Q_{GS}$	-	0.32	-			
Gate-Drain Charge	$Q_{GD}$	-	0.23	-			
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>							
Forward On Voltage	$T_J=25^\circ\text{C}$	$V_{SD}$	-	0.65	0.7	V	$V_{GS}=0V$ $I_S=10mA$
	$T_J=125^\circ\text{C}$		-	0.45	-		
Reverse Recovery Time		$T_{rr}$	-	14	-	nS	$V_{GS}=0V, I_S=10mA, di/dt=8A/\mu s$

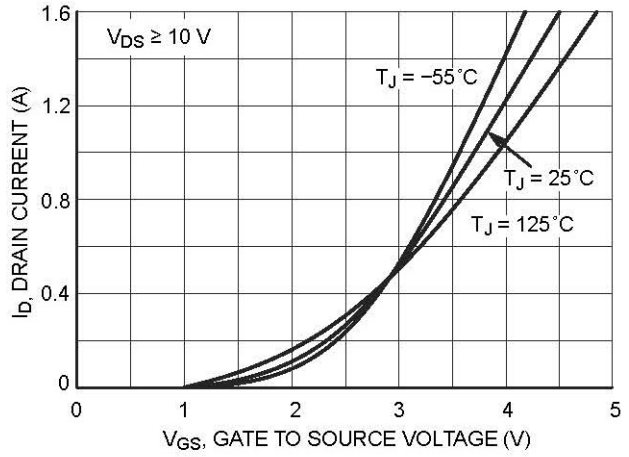
**Note:**

3. Pulse Test: Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Switching characteristics are independent of operating junction temperatures.

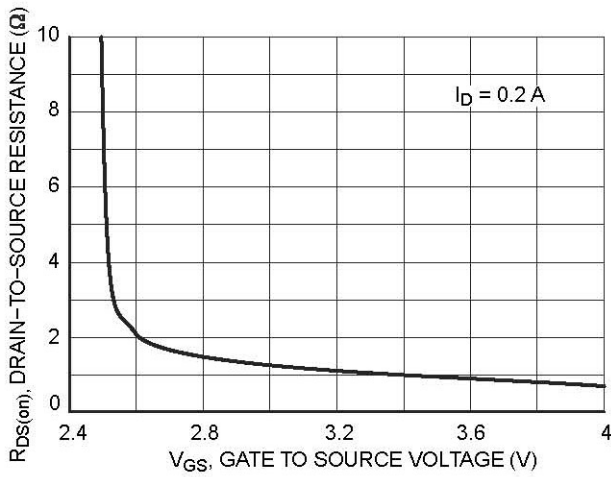
**CHARACTERISTIC CURVES**



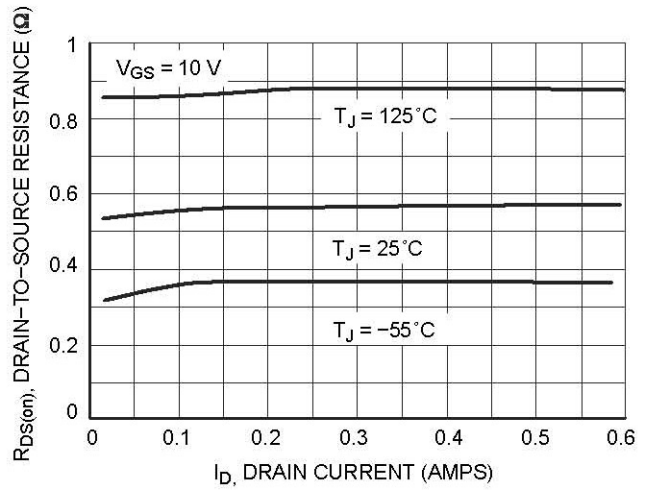
**Figure 1. On Region Characteristics**



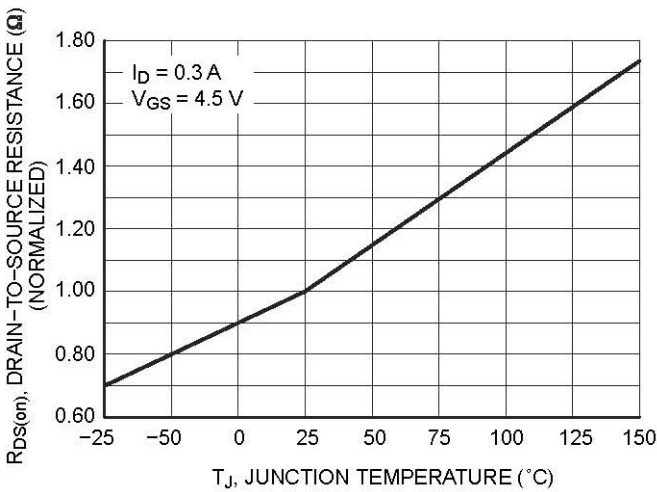
**Figure 2. Transfer Characteristics**



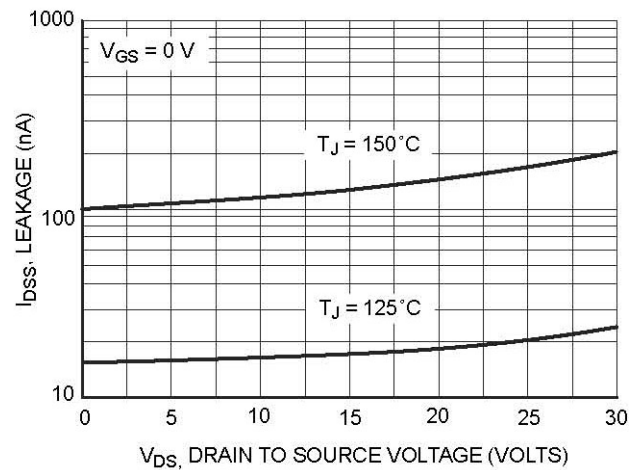
**Figure 3. On Resistance vs. Gate to Source Voltage**



**Figure 4. On Resistance vs. Drain Current and Temperature**



**Figure 5. On Resistance Variation with Temperature**



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

**CHARACTERISTIC CURVES**

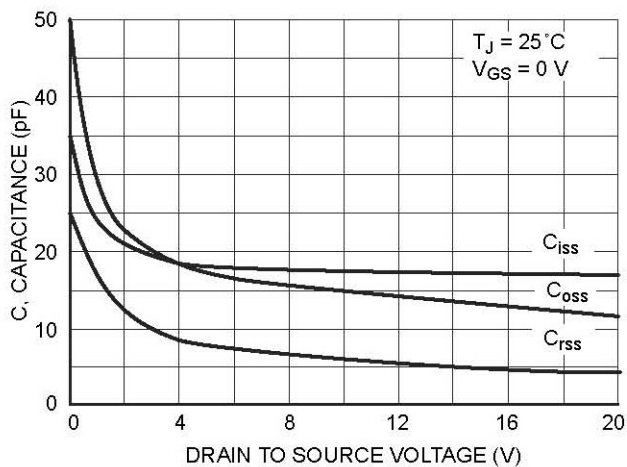


Figure 7. Capacitance Variation

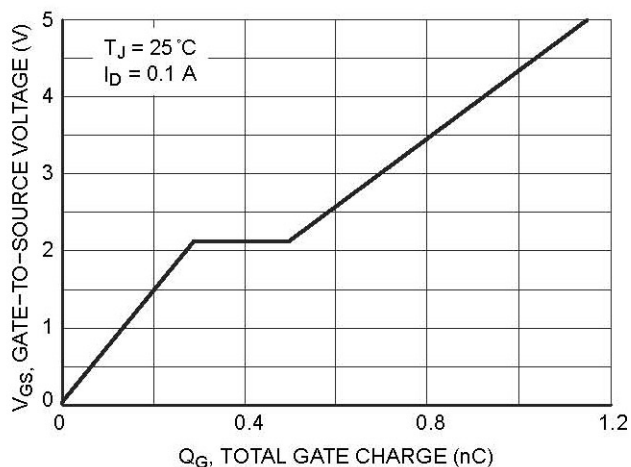


Figure 8. Gate to Source & Drain to Source Voltage vs. Total Charge

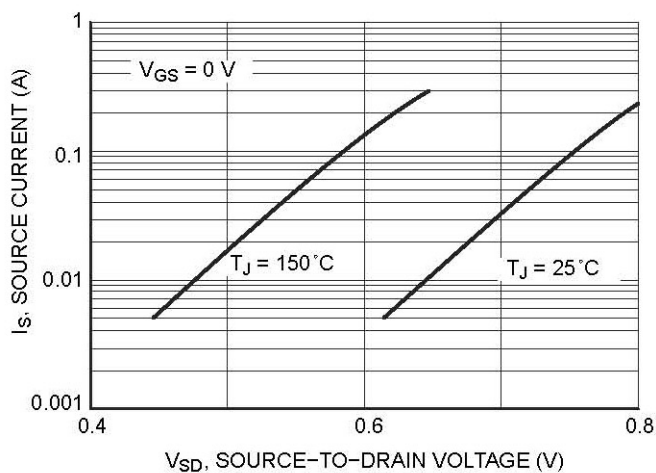


Figure 9. Diode Forward Voltage vs. Current