

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

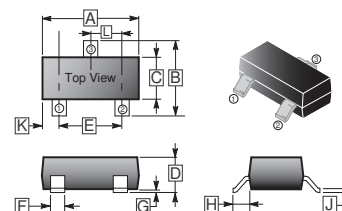
**SOT-23**

## 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

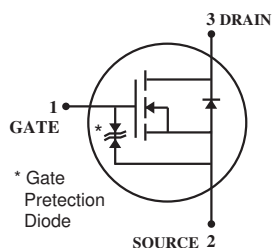
## APPLICATION

- 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	$\mu A$	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ C$	
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	-	$\mu F$	$V_{DS}=5V$ $V_{GS}=0V$ $f=1MHz$	
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	$T_J=25^\circ C$	$V_{SD}$	-	0.65	0.7	V	$V_{GS}=0V$ $I_S=10mA$
	$T_J=125^\circ C$		-	0.45	-		
Reverse Recovery Time		$T_{rr}$	-	14	-	$nS$	$V_{GS}=0V, I_S=10mA, di/dt=8A/\mu s$

**Note:**

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

**CHARACTERISTIC CURVES**

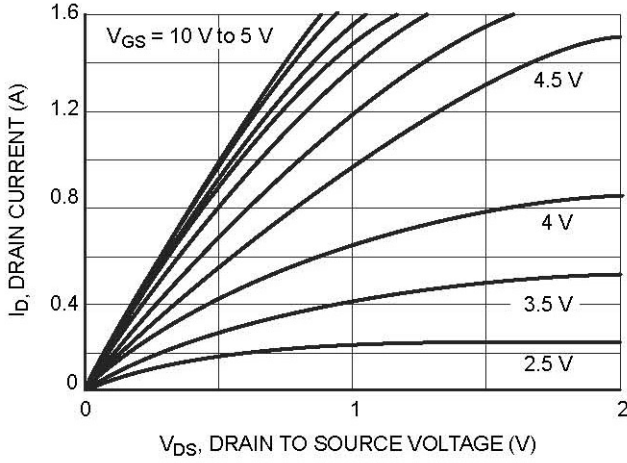


Figure 1. On Region Characteristics

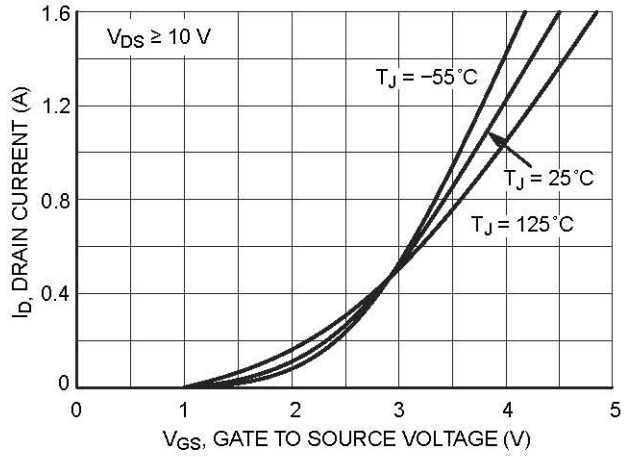


Figure 2. Transfer Characteristics

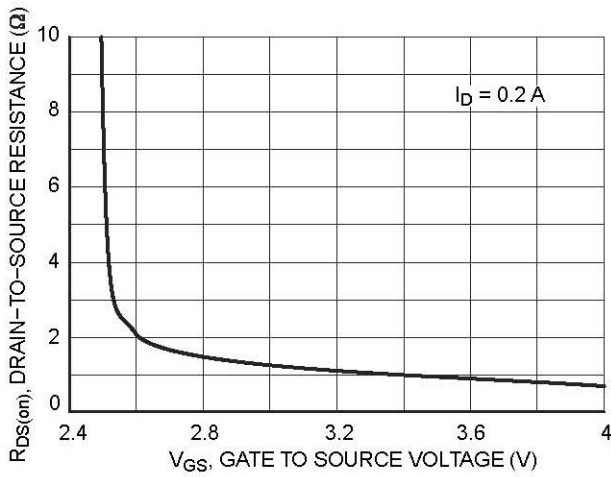


Figure 3. On Resistance vs. Gate to Source Voltage

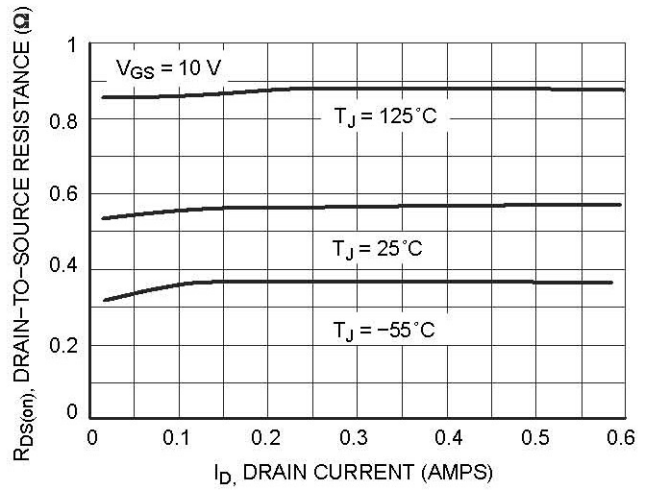


Figure 4. On Resistance vs. Drain Current and Temperature

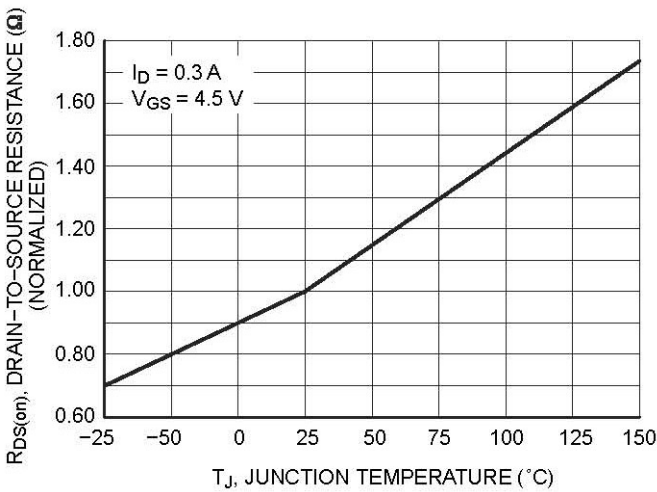


Figure 5. On Resistance Variation with Temperature

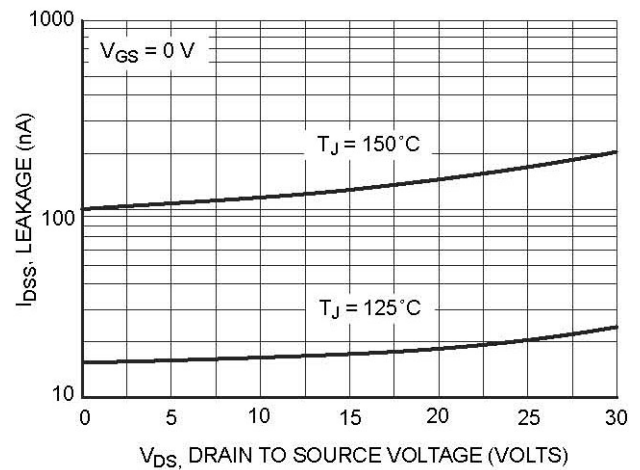


Figure 6. Drain to Source Leakage Current vs. Voltage

**CHARACTERISTIC CURVES**

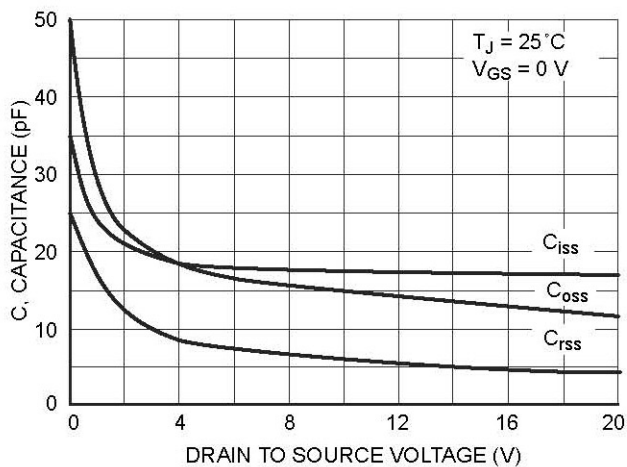


Figure 7. Capacitance Variation

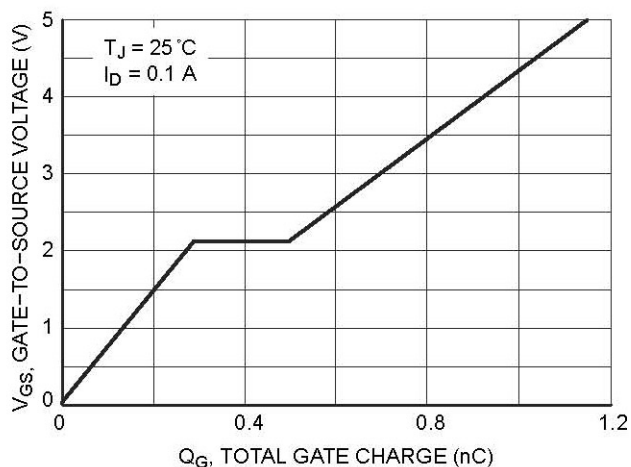


Figure 8. Gate to Source & Drain to Source Voltage vs. Total Charge

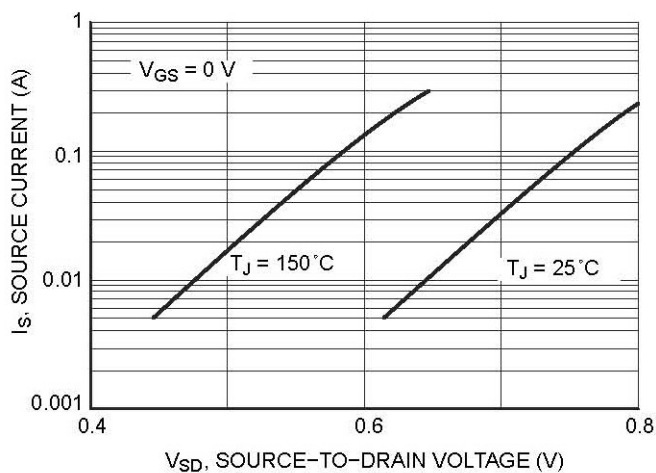


Figure 9. Diode Forward Voltage vs. Current