



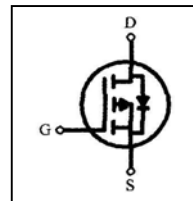
# FCI2301 P-Channel High-Density Trench MOSFET

## DESCRIPTION

Our FCI2301 P-Channel High-Density Trench MOSFETs utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design of our products provides the designer with an extremely efficient and reliable device for use in a variety of applications.

## FEATURES

- Super high dense cell trench design for low  $R_{DS(on)}$
- P-Channel Trench MOSFET
- SOT-23-3L Footprint
- Available in Tape and Reel
- Rugged and Reliable



$V_{DSS} = -20V$

$R_{DS(on)} = 130m\Omega$  (max.) @  $V_{GS} = -4.5V$  ( $I_D = -2.8A$ )

$R_{DS(on)} = 190m\Omega$  (max.) @  $V_{GS} = -2.5V$  ( $I_D = -2.0A$ )

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Continuous Drain Current <sup>1</sup> @ $T_A = 25^\circ C$	$I_D$	-2.3	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-10	
Maximum Power Dissipation <sup>1</sup>	$P_D$	1.25	W
Drain-Source Diode Forward Current <sup>1</sup>	$I_S$	-1.6	A
Gate-to-Source Voltage	$V_{GS}$	$\pm 8$	V
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to + 150	$^\circ C$

## THERMAL RESISTANCE

Characteristic	Symbol	Value	Unit
Junction-to-Ambient Thermal Resistance <sup>1</sup>	$R_{\theta JA}$	85	$^\circ C/W$

Notes:

1. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
2. Pulse Test: Pulse width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2\%$ .



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

Parameter	Symbol	Condition	Min.	Typ. <sup>3</sup>	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16V, V_{GS} = 0V$			-1	$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = -8V, V_{DS} = 0V$			-100	nA
<b>ON CHARACTERISTICS<sup>2</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.6			V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.8A$			130	$m\Omega$
		$V_{GS} = -2.5V, I_D = -2.0A$			190	$m\Omega$
<b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>2</sup></b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = -1.0A$			-1.0	V
<b>SWITCHING CHARACTERISTICS<sup>2</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10V, I_D = -1A$ $V_{GS} = -4.5V$		4.32		nC
Gate-Source Charge	$Q_{gs}$			1.06		nC
Gate-Drain Charge	$Q_{gd}$			0.84		nC
<b>SWITCHING CHARACTERISTICS<sup>3</sup></b>						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = -10V, I_D = -1A$ $V_{GEN} = -4.5V$ $R_L = 10\text{ ohms}$ $R_{GEN} = 10\text{ ohms}$		13		ns
Rise Time	$t_r$			36		ns
Turn-Off Delay Time	$t_{D(OFF)}$			42		ns
Fall Time	$t_f$			34		ns

Notes:

2. Pulse Test: Pulse width  $\leq 300\ \mu s$ , Duty Cycle  $\leq 2\%$ .
3. Guaranteed by design, not subject to production testing.



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## RATINGS AND CHARACTERISTIC CURVES

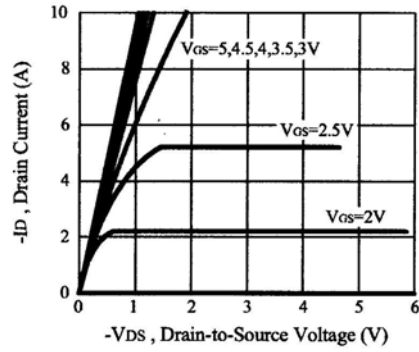


Figure 1. Output Characteristics

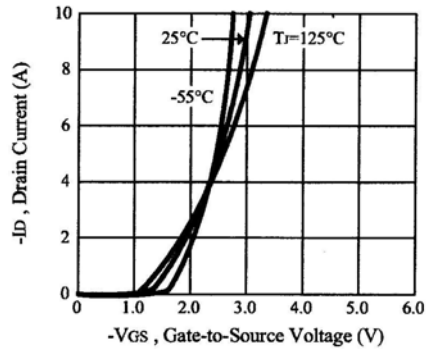


Figure 2. Transfer Characteristics

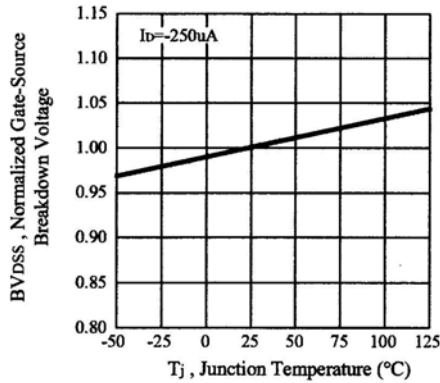


Figure 3. Breakdown Voltage Variation with Temperature

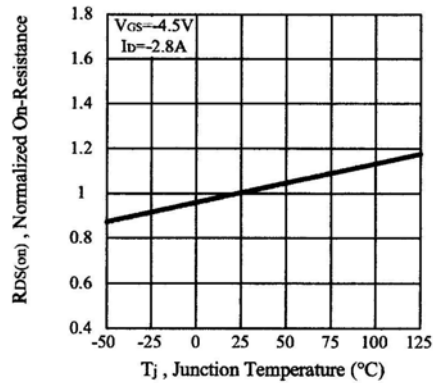


Figure 4. On-Resistance Variation with Temperature

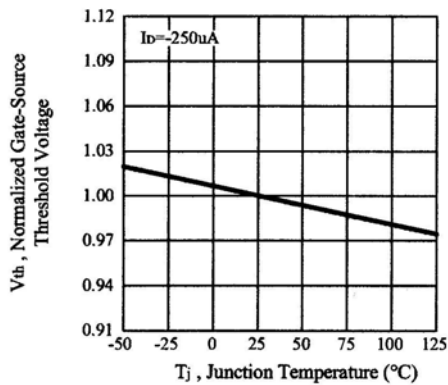


Figure 5. Gate Threshold Variation with Temperature

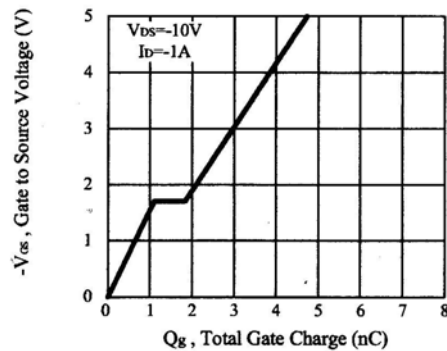


Figure 6. Gate Charge



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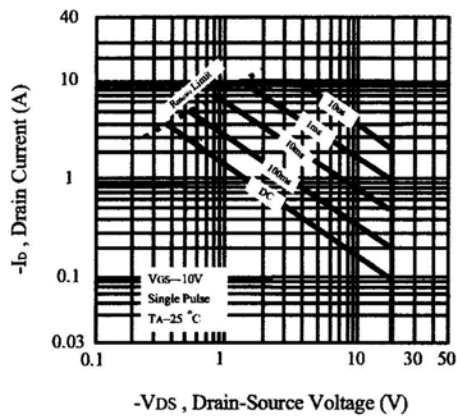


Figure 7. Maximum Safe Operating Area

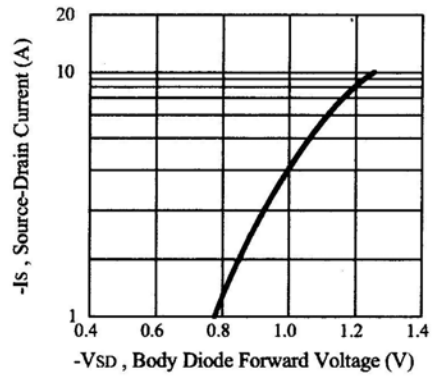


Figure 8. Body Diode Forward Voltage Variation with Source Current

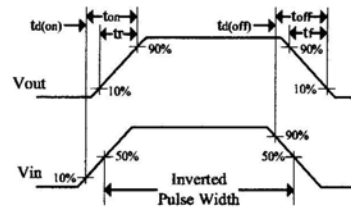
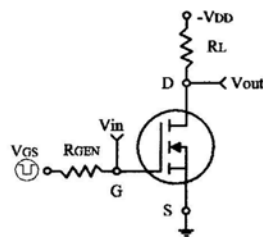


Figure 9. Switching Test Circuit and Switching Waveforms

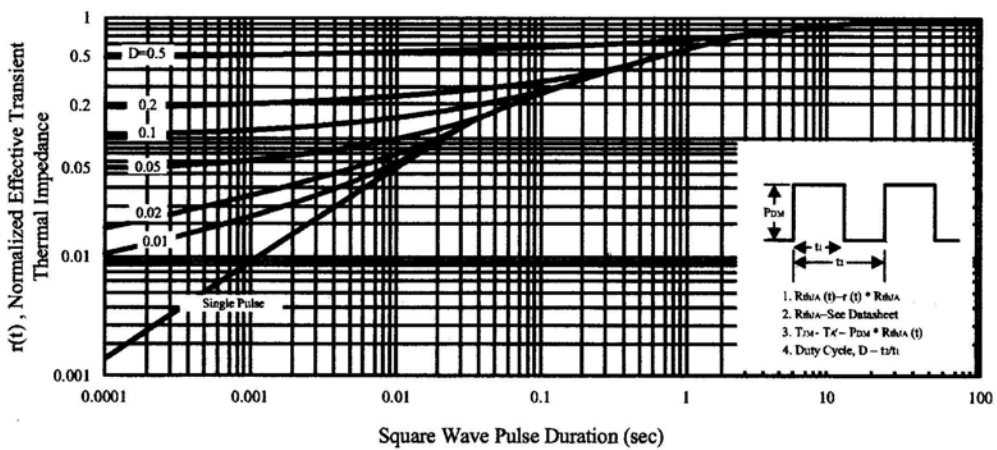
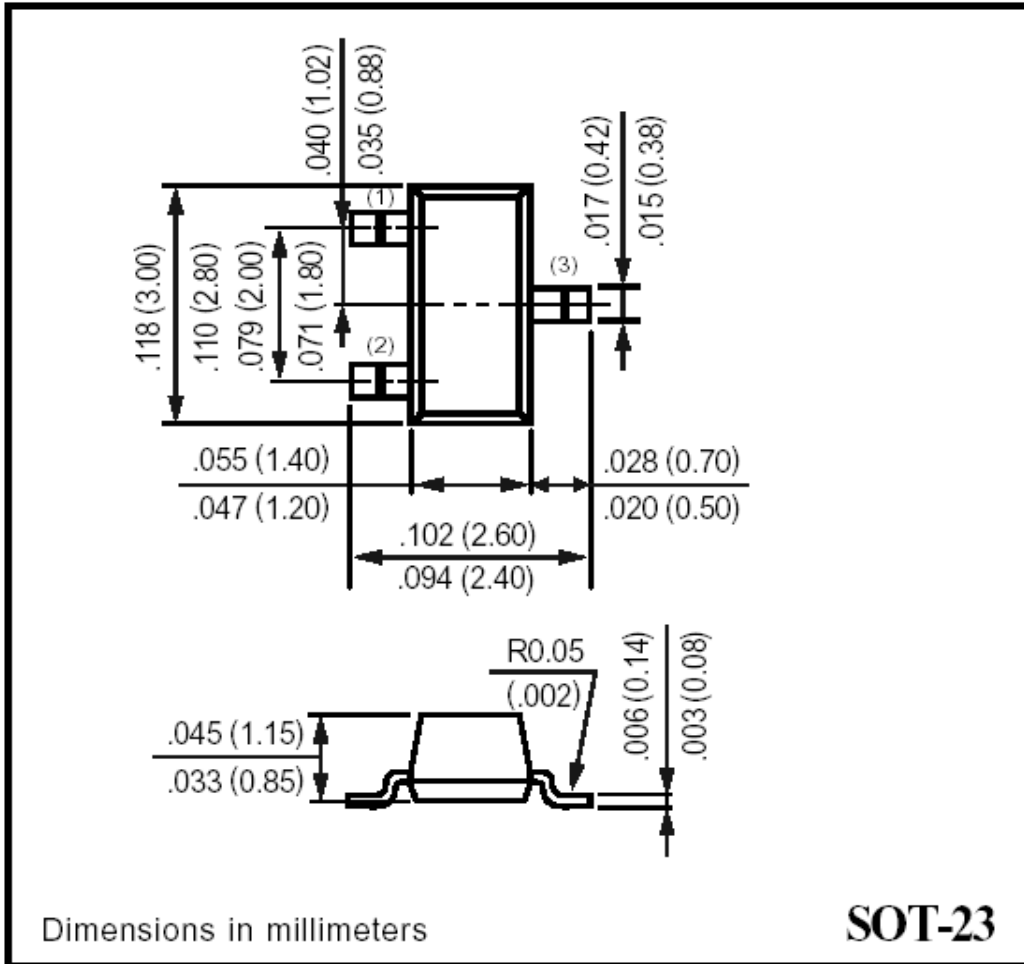


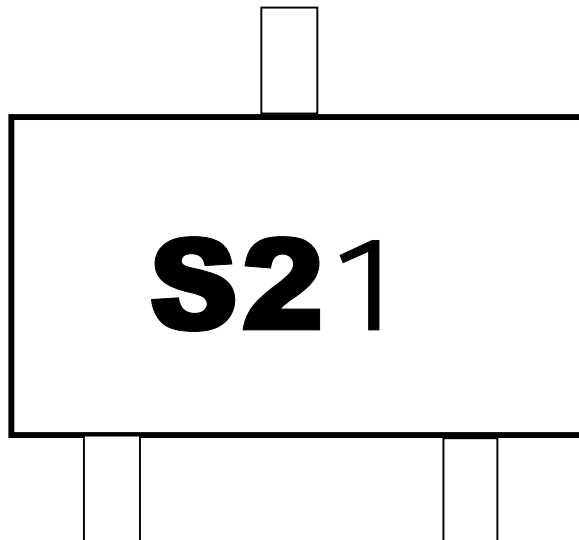
Figure 10. Normalized Thermal Transient Impedance Curve



SOT-23 PACKAGE DIMENSIONS



Marking



Marking Guide: S21 = FCI2301 SOT-23 Package