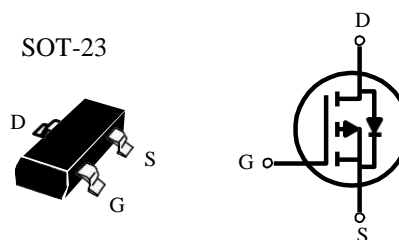


## P-Channel High Density Trench MOSFET

### Features:

- Super high dense cell trench design for low  $R_{DS(on)}$ .
- Rugged and reliable.
- SOT-23 package.



### PRODUCT SUMMARY

$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m $\Omega$ ) Max
-30V	-4.3A	58 @ $V_{GS} = -10V$
		72 @ $V_{GS} = -4.5V$
		86 @ $V_{GS} = -2.5V$

### DEVICE MARKING

K3401 = 31  $\curvearrowright$  / 3401/ X1DV

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous <sup>a</sup> @ $T_A = 25^\circ C$ -Pulse <sup>b</sup>	$I_D$	-4.3	A
	$I_{DM}$	-16	A
Drain-Source Diode Forward Current <sup>a</sup>	$I_S$	-2.2	A
Maximum Power Dissipation <sup>a</sup>	$P_D$	1.25	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to 150	$^\circ C$

### THERMAL CHARACTERISTICS

Parameter	Symbol	Typ <sup>c</sup>	Max	Unit
Thermal Resistance, Junction-to-Ambient <sub>a</sub>	$R_{thJA}$	75	100	$^\circ C/W$

Note :

a. Surface Mounted on FR4 Board ,  $t \leq 5sec$  .

b. Pulse Test : Pulsewidth  $\leq 300\mu s$  , Duty Cycle  $\leq 2\%$  .

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

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$			-1	$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = -12V, V_{DS} = 0V$			-100	nA
<b>ON CHARACTERISTICS<sup>b</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.7	-1.0	-1.3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -4.2A$		46	58	$m\Omega$
		$V_{GS} = -4.5V, I_D = -4.0A$		55	72	$m\Omega$
		$V_{GS} = -2.5V, I_D = -1.0A$		65	86	$m\Omega$
<b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>b</sup></b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = -1.0A$			-1.0	V
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	$C_{ISS}$	$V_{DS} = 15V, V_{GS} = 0V$ $f = 1.0MHz$		1078		pF
Output Capacitance	$C_{OSS}$			155		pF
Reverse Transfer Capacitance	$C_{RSS}$			126		pF
<b>SWITCHING CHARACTERISTICS<sup>c</sup></b>						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = -15V, I_D = -1A$		5		ns
Rise Time	$t_r$		$V_{GEN} = -4.5V$		3	
Turn-Off Delay Time	$t_{D(OFF)}$	$R_L = 15\ \Omega$		30		ns
Fall Time	$t_f$	$R_{GEN} = 10\ \Omega$		10		ns
Total Gate Charge	$Q_g$	$V_{DS} = -15V$		25.2		nC
Gate-Source Charge	$Q_{gs}$	$I_D = -1A$		3.1		nC
Gate-Drain Charge	$Q_{gd}$	$V_{GS} = -10V$		2.3		nC

Note

b. Pulse Test : Rise width 300 $\mu s$ , Duty Cycle 2%.

c. Guaranteed by design, not subject to production testing.

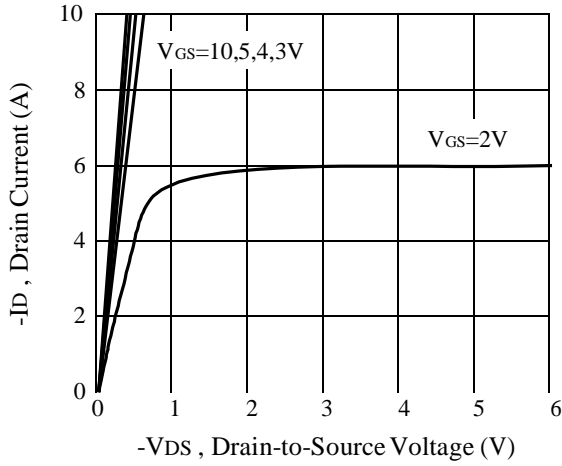


Figure 1. Output Characteristics

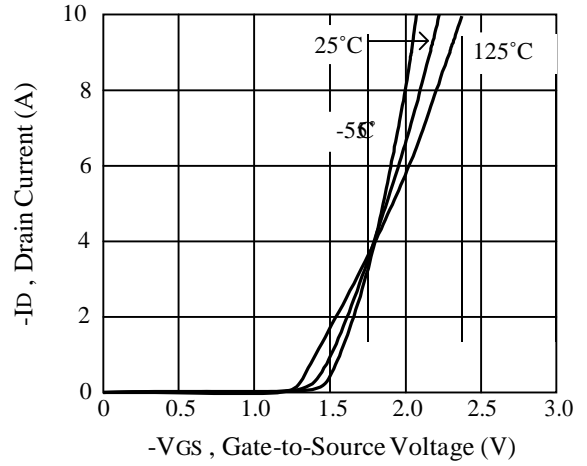


Figure 2. Transfer Characteristics

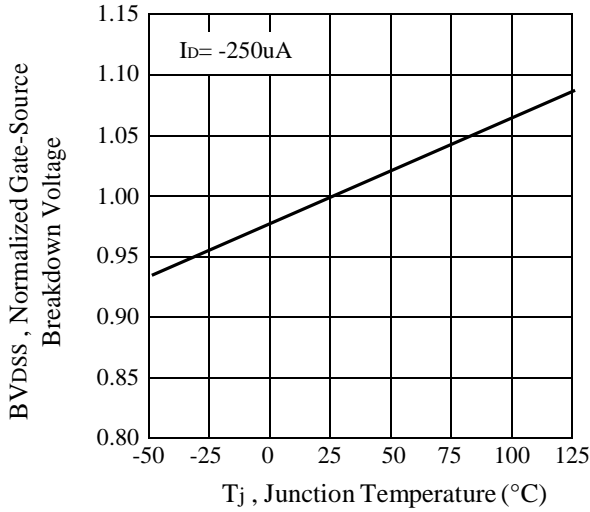


Figure 6. Breakdown Voltage Variation with Temperature

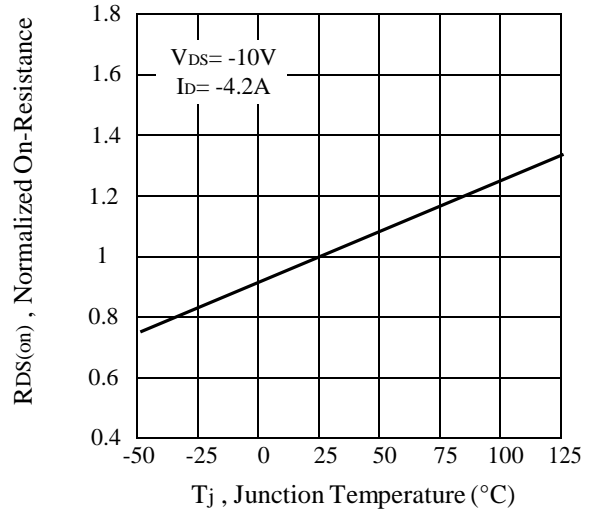


Figure 4. On-Resistance Variation with Temperature

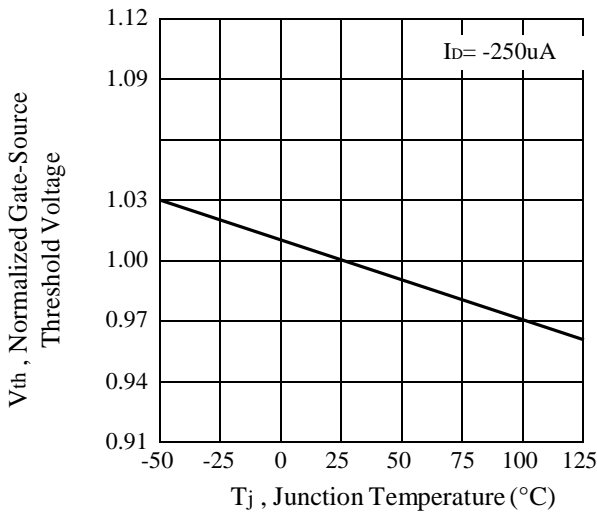


Figure 5. Gate Threshold Variation with Temperature

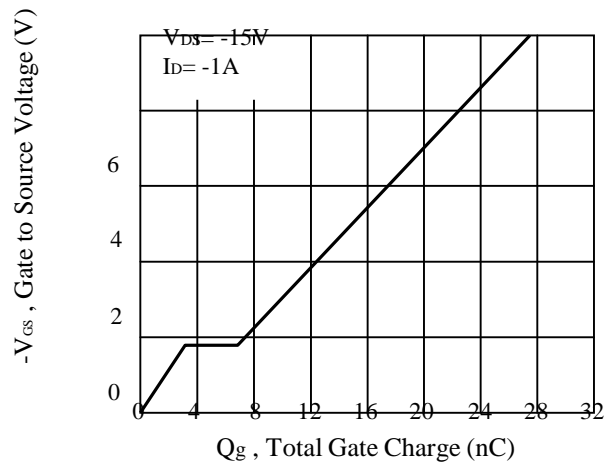


Figure 7. Gate Charge

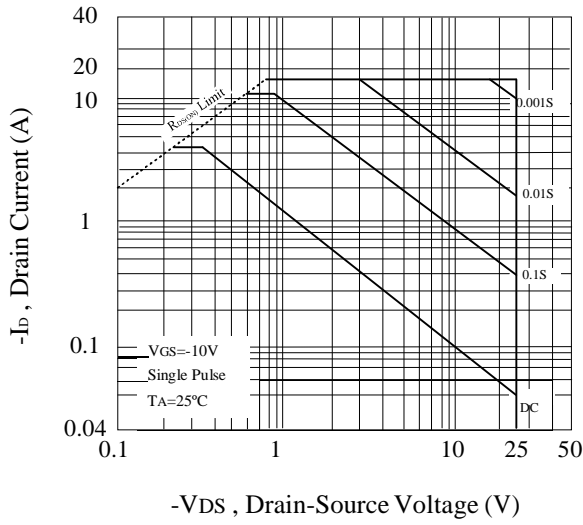


Figure 9. Maximum Safe Operating Area

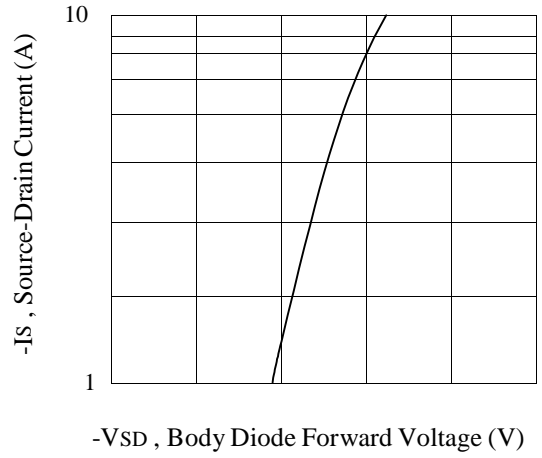


Figure 8. Body Diode Forward Voltage Variation with Source Current

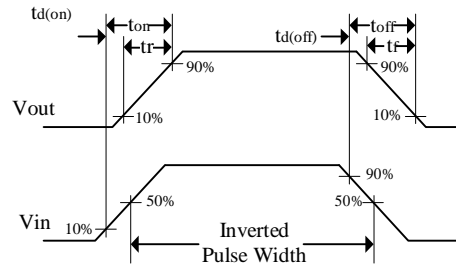
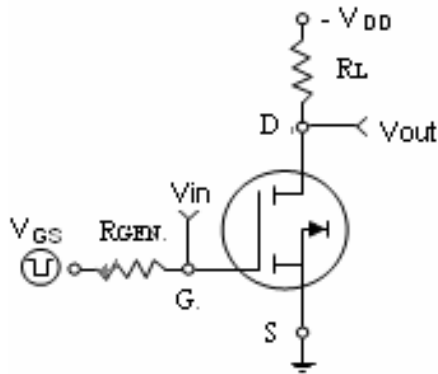


Figure 10. Switching Test Circuit and Switching Waveforms

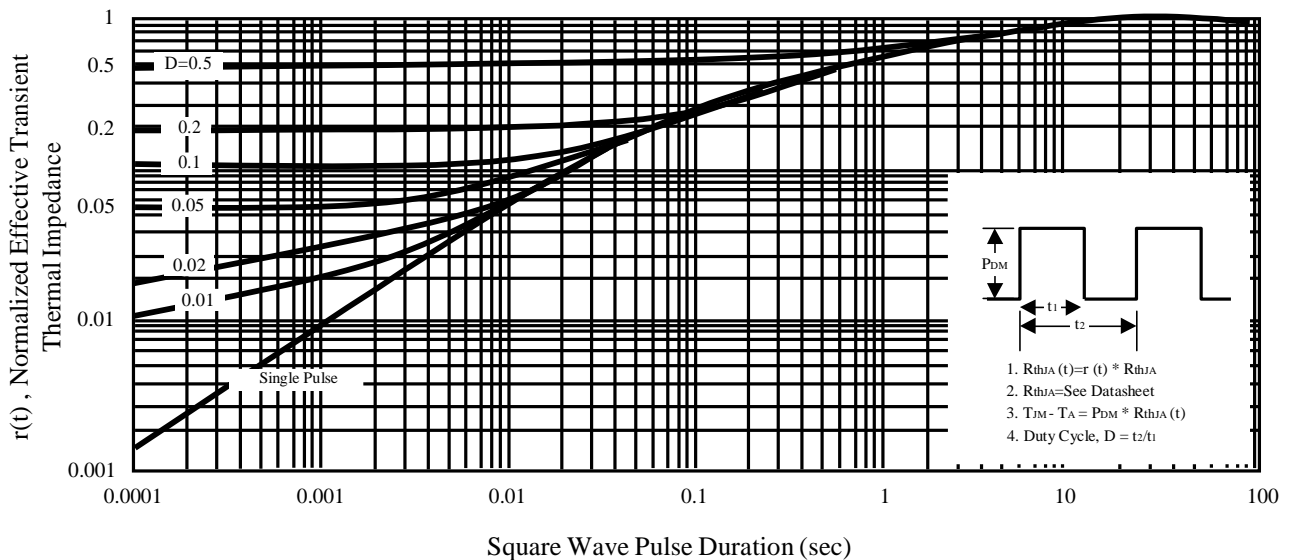


Figure 11. Normalized Thermal Transient Impedance Curve