

VB2101K Datasheet

P-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.50 at $V_{GS} = - 10$ V	- 1.5	7.7
	0.56 at $V_{GS} = - 6.0$ V	- 1.4	

FEATURES

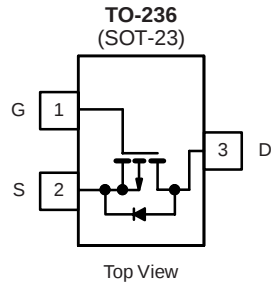
- Halogen-free According to IEC 61249-2-21 Available
- Trench Power MOSFET
- Ultra Low On-Resistance
- Small Size



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Active Clamp Circuits in DC/DC Power Supplies



ABSOLUTE MAXIMUM RATINGS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted

Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 100		V
Gate-Source Voltage		V_{GS}	$\pm$ 20		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^{a, b}	$T_A = 25\text{ }^{\circ}\text{C}$	I_D	- 1.65	- 1.5	A
	$T_A = 70\text{ }^{\circ}\text{C}$		- 1.55	- 1.4	
Pulsed Drain Current		I_{DM}	- 3.0		
Continuous Source Current (Diode Conduction) ^{a, b}		I_S	- 1.4	- 1.0	
Single Pulse Avalanche Current	L = 1.0 mH	I_{AS}	4.5		
Single Pulse Avalanche Energy		E_{AS}	1.01		mJ
Maximum Power Dissipation ^{a, b}	$T_A = 25\text{ }^{\circ}\text{C}$	P_D	2.0	0.85	W
	$T_A = 70\text{ }^{\circ}\text{C}$		1.0	0.58	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	t ≤ 5 s	R _{thJA}	75	100	°C/W
	Steady State		120	166	
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	40	50	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = - 250 μA	- 100			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.0		- 3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 100 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 100 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 15 V, V _{GS} = 10 V	- 1.6			A
Drain-Source On-Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 0.5 A		0.50		Ω
		V _{GS} = - 6.0 V, I _D = - 0.5 A		0.56		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 0.5 A		2.2		S
Diode Forward Voltage	V _{SD}	I _S = - 1.0 A, V _{GS} = 0 V		0.7	- 1.2	V
Dynamic ^b						
Total Gate Charge	Q _g	V _{DS} = - 50 V, V _{GS} = 10 V, I _D ≅ - 0.5 A		7.7	12	nC
Gate-Source Charge	Q _{gs}			1.5		
Gate-Drain Charge	Q _{gd}			2.5		
Gate Resistance	R _g	f = 1.0 MHz		9		Ω
Input Capacitance	C _{iss}	V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz		520		pF
Output Capacitance	C _{oss}			40		
Reverse Transfer Capacitance	C _{rss}			20		
Switching ^c						
Turn-On Time	t _{d(on)}	V _{DD} = - 50 V, R _L = 75 Ω I _D ≅ - 1.0 A, V _{GEN} = - 10 V R _g = 6 Ω		7	11	ns
	t _r			11	17	
Turn-Off Time	t _{d(off)}			16	25	
	t _f			11	17	
Body Diode Reverse Recovery Charge	Q _{rr}	I _F = 0.5 A, dI/dt = 100 A/μs		90	135	nC

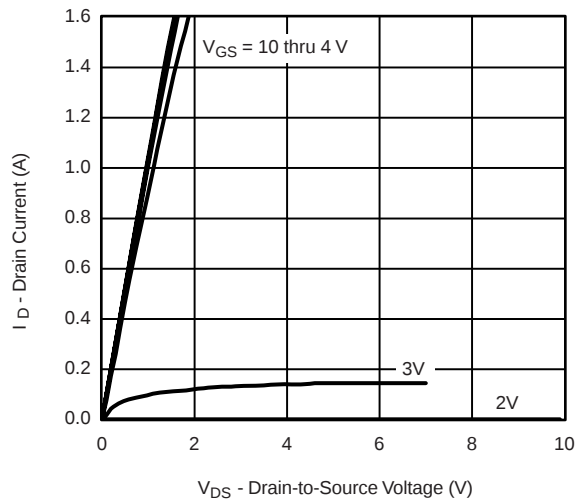
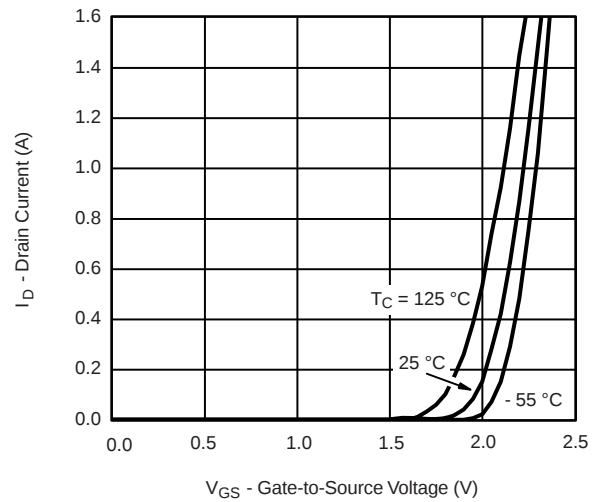
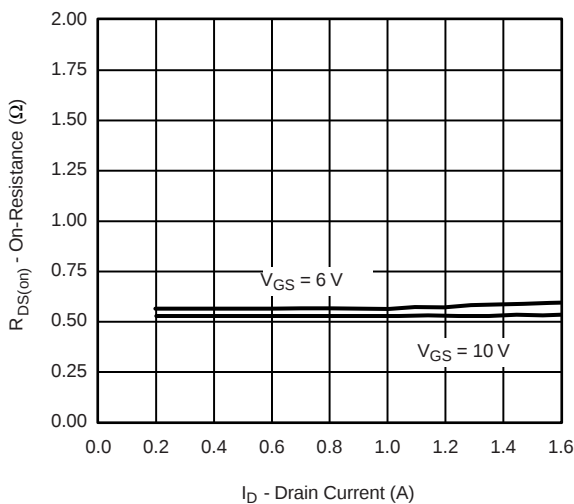
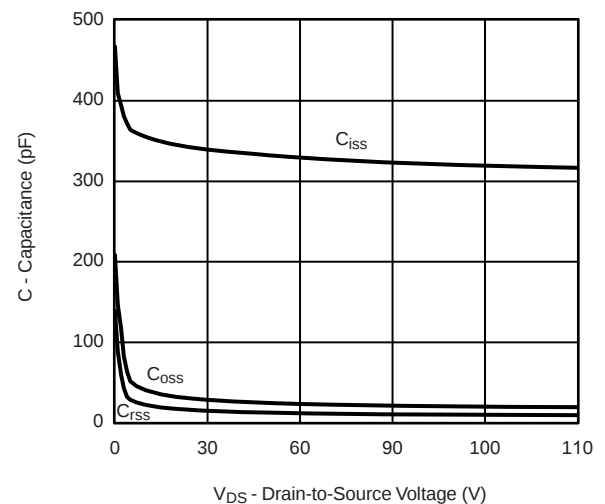
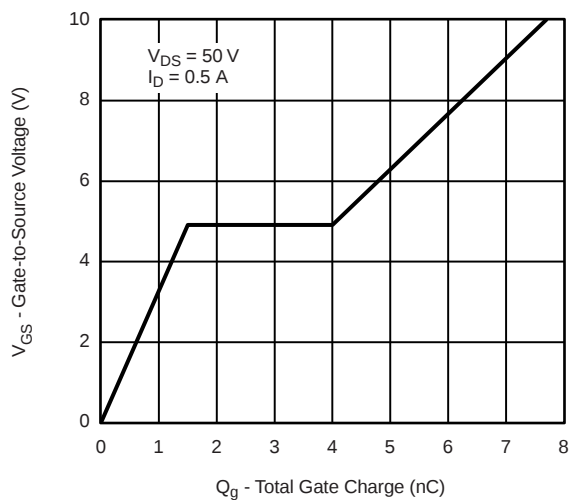
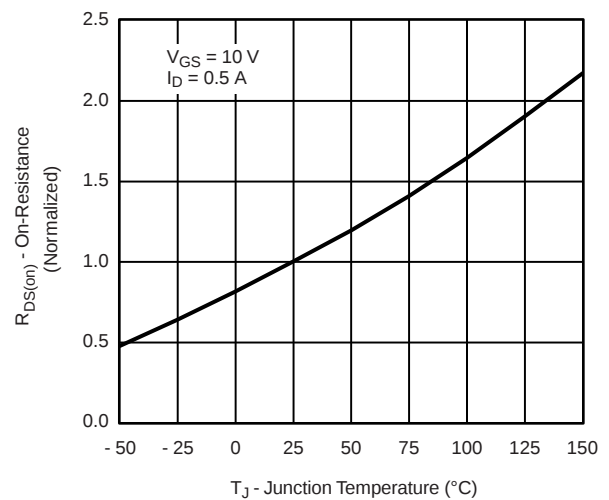
Notes:

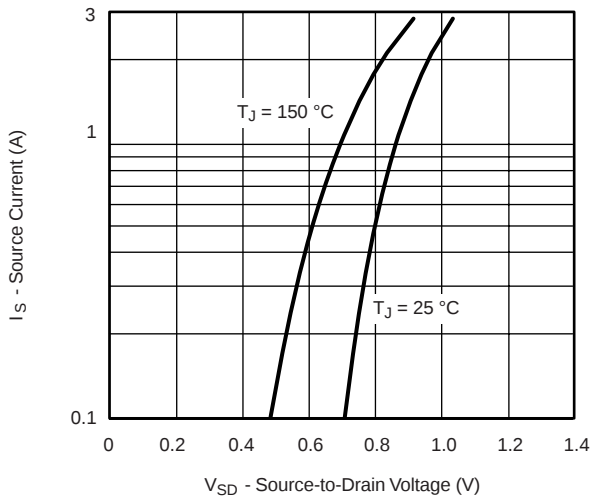
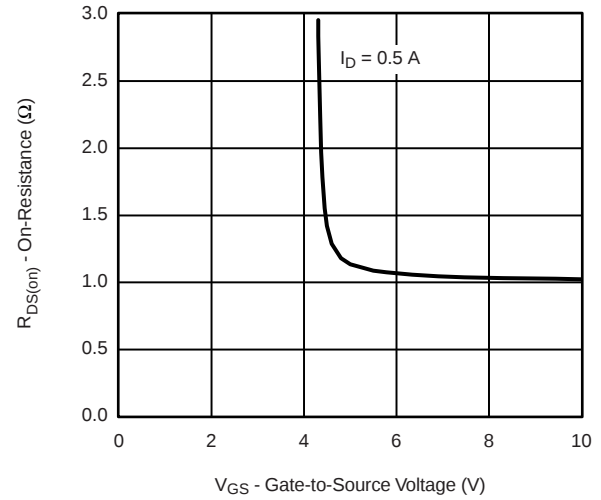
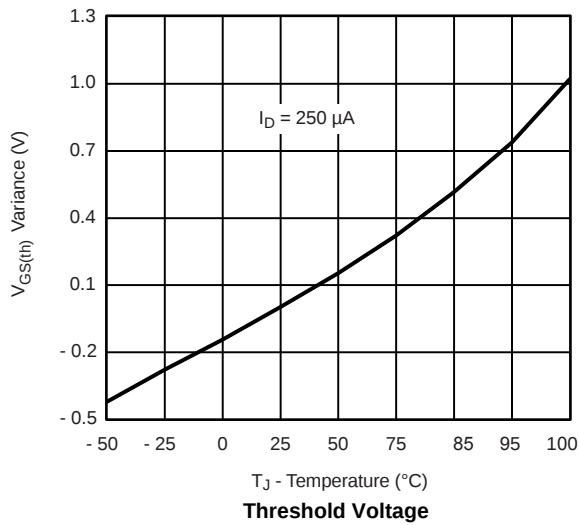
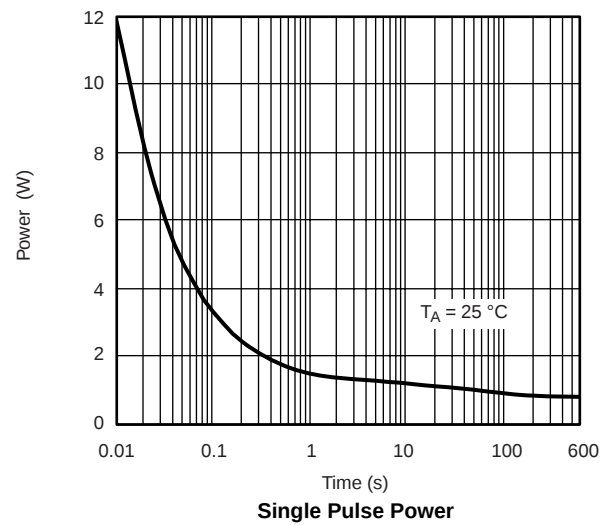
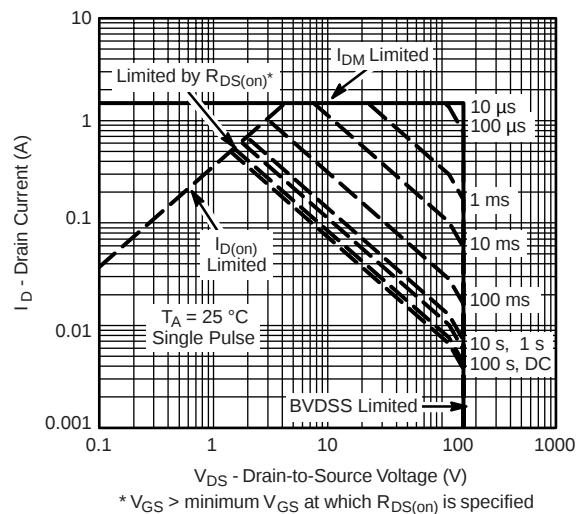
a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.

b. For DESIGN AID ONLY, not subject to production testing.

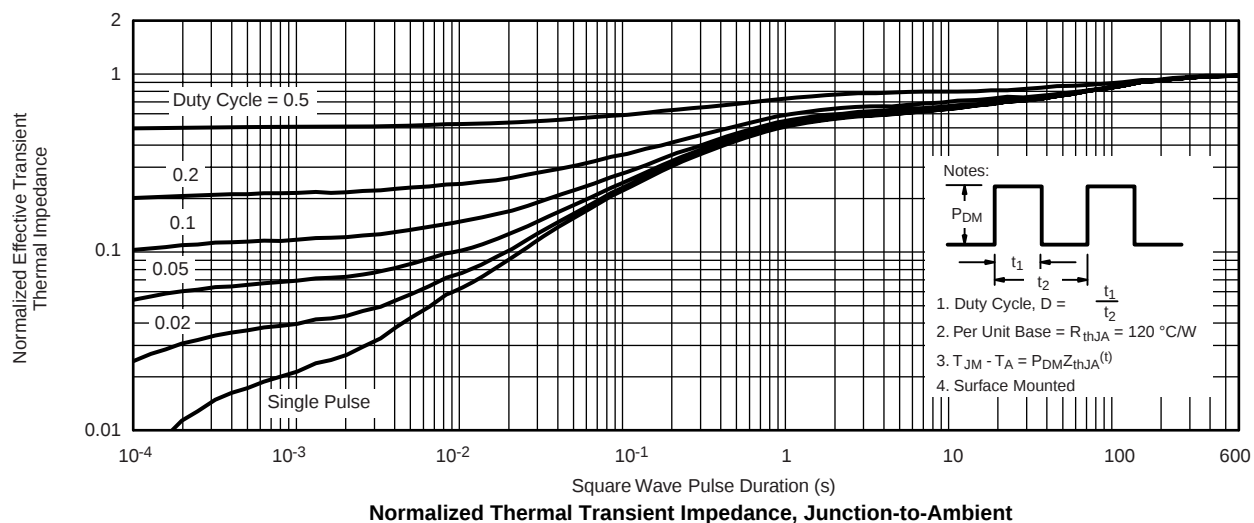
c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

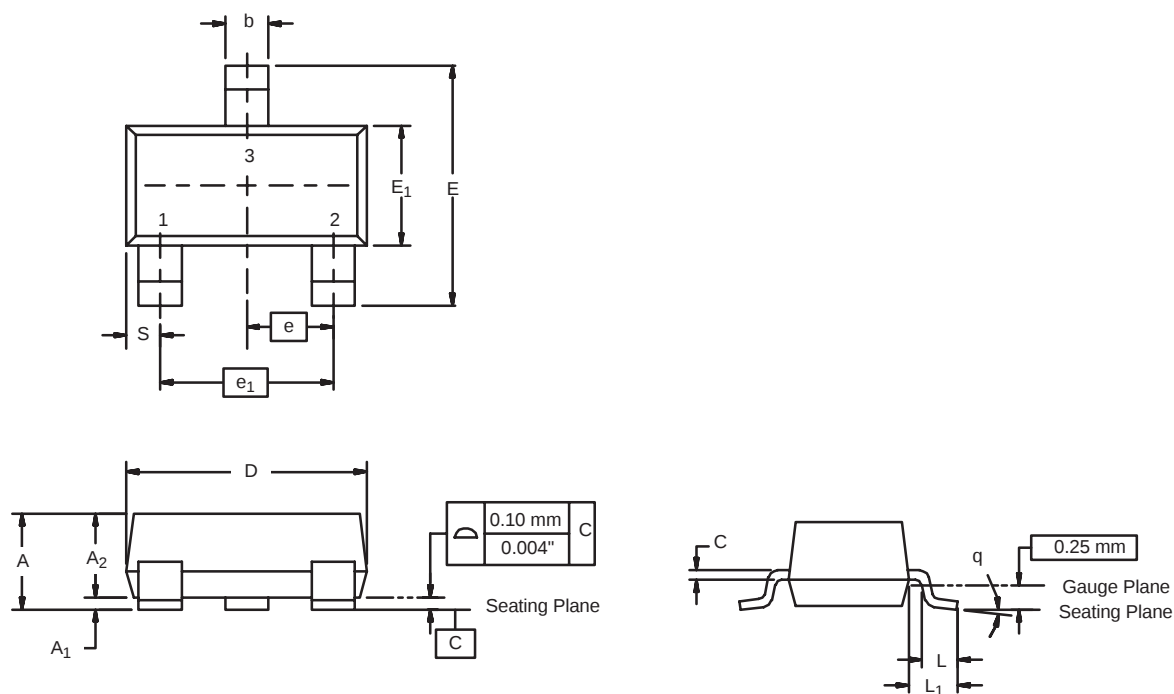
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power

Safe Operating Area

* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

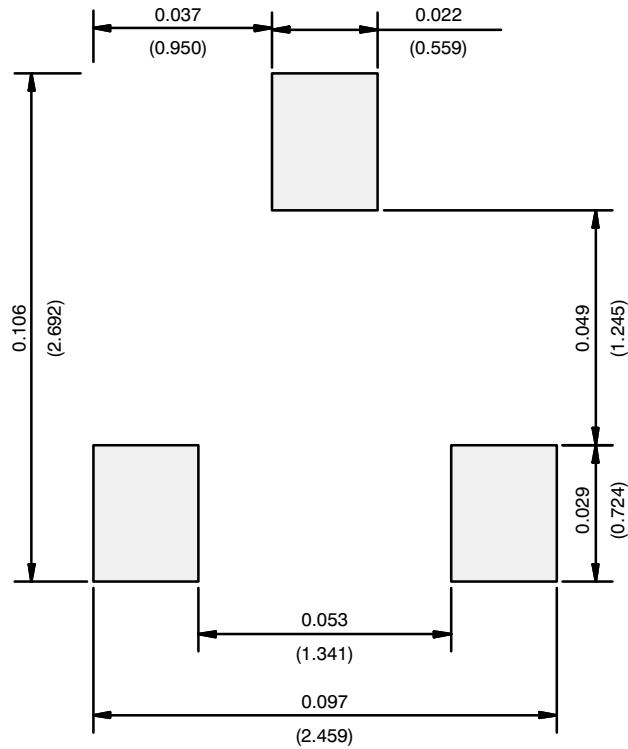
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)


SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01 DWG: 5479				

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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