

2SK3156-VB Datasheet

N-Channel 150-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
150	0.030 at $V_{GS} = 10$ V	50
	0.033 at $V_{GS} = 6$ V	45

FEATURES

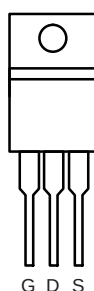
- Trench Power MOSFETs
- 175 °C Junction Temperature
- New Low Thermal Resistance Package
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

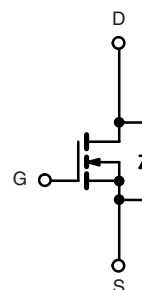
APPLICATIONS

- Primary Side Switch

TO-220AB



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	50	A
		35	
Pulsed Drain Current	I_{DM}	150	
Avalanche Current	I_{AR}	50	mJ
Repetitive Avalanche Energy ^a	E_{AR}	80	
Maximum Power Dissipation ^a	P_D	166 ^b	W
		3.75	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.9	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

c. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{DS} = 0 V, I _D = 250 μA	150			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 120 V, V _{GS} = 0 V			1	μA
		V _{DS} = 120 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 120 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	80			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 15 A		0.030		Ω
		V _{GS} = 6 V, I _D = 10 A		0.033		
		V _{GS} = 10 V, I _D = 15 A, T _J = 125 °C		0.076		
		V _{GS} = 10 V, I _D = 15 A, T _J = 175 °C		0.100		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A	10			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		2500		pF
Output Capacitance	C _{oss}			290		
Reverse Transfer Capacitance	C _{rss}			190		
Gate Resistance	R _g			2		Ω
Total Gate Charge ^c	Q _g	V _{DS} = 75 V, V _{GS} = 10 V, I _D = 40 A		38	60	nC
Gate-Source Charge ^c	Q _{gs}			13		
Gate-Drain Charge ^c	Q _{gd}			13		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 75 V, R _L = 1.80 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _g = 2.5 Ω		15	25	ns
Rise Time ^c	t _r			130	200	
Turn-Off Delay Time ^c	t _{d(off)}			30	45	
Fall Time ^c	t _f			90	140	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				40	A
Pulsed Current	I _{SM}				80	
Forward Voltage ^a	V _{SD}	I _F = 40 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 40 A, dI/dt = 100 A/μs		100	150	ns
Peak Reverse Recovery Current	I _{RM(REC)}			5	8	A
Reverse Recovery Charge	Q _{rr}				0.25	0.6

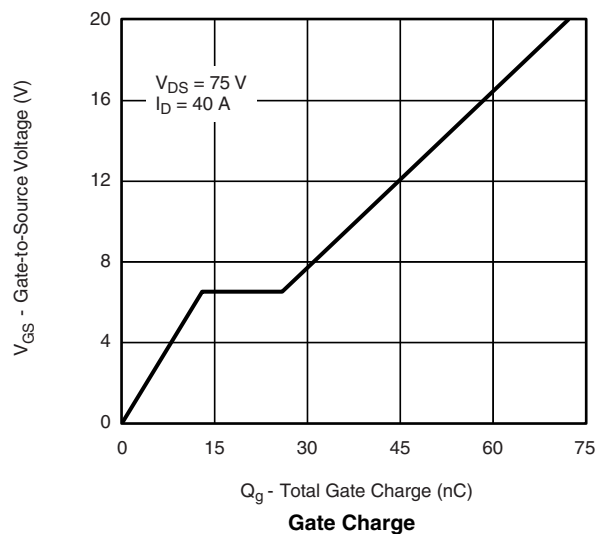
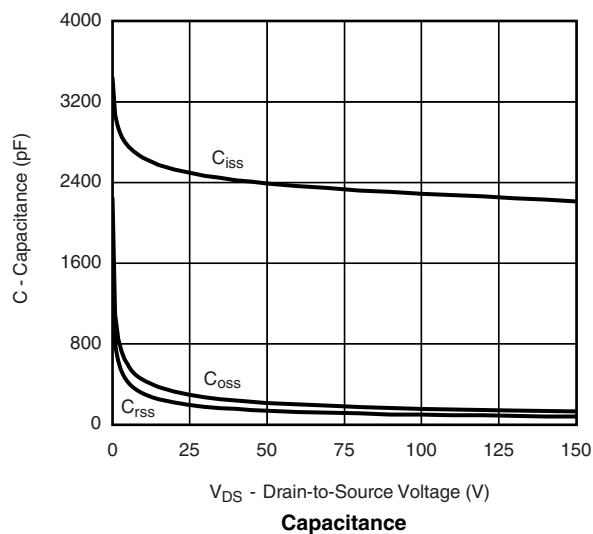
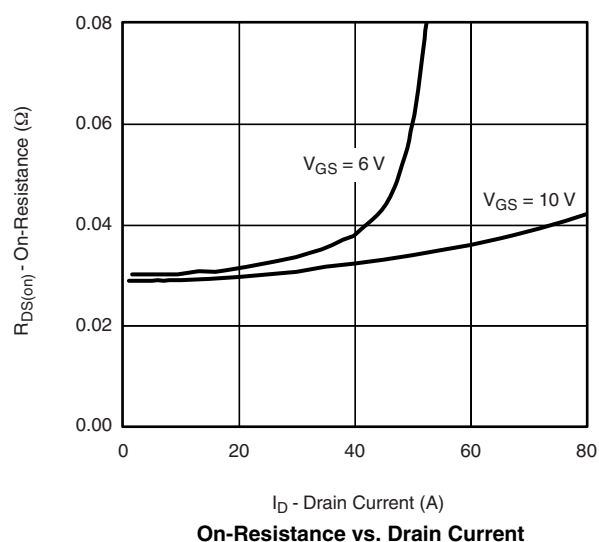
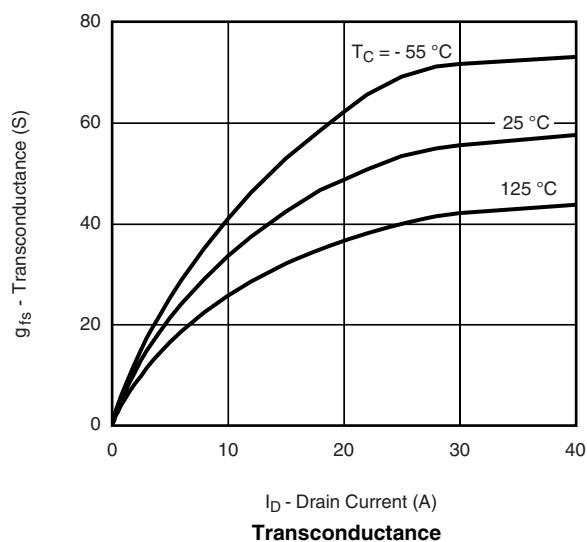
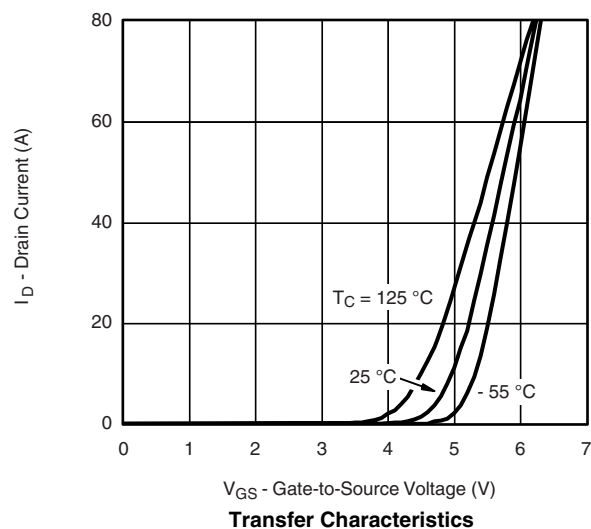
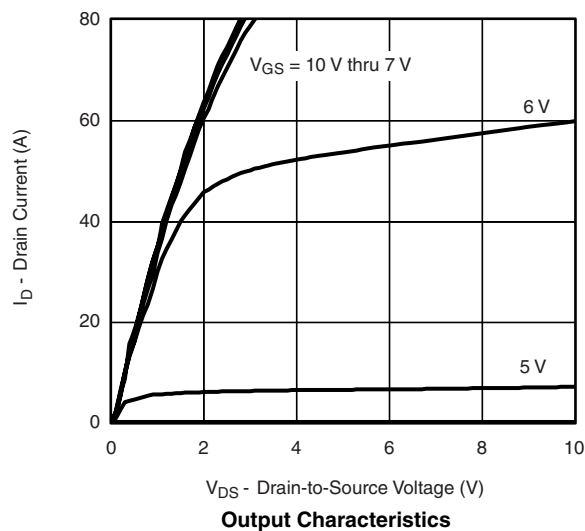
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

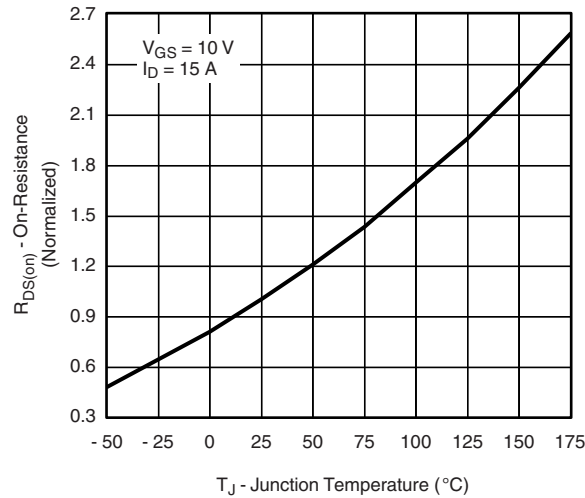
b. Guaranteed by design, not subject to production testing.

c. Independent of operating temperature.

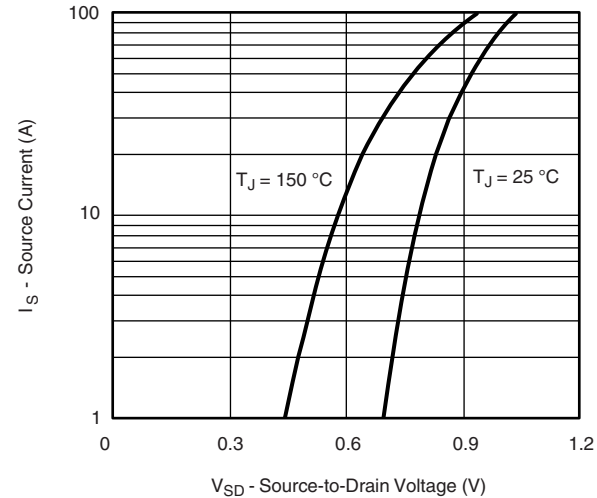
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


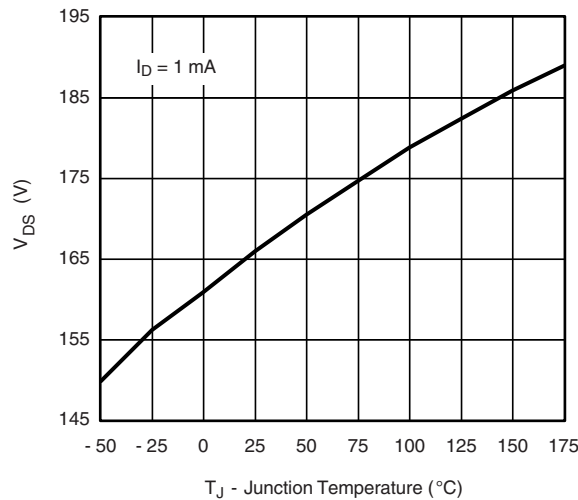
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



On-Resistance vs. Junction Temperature

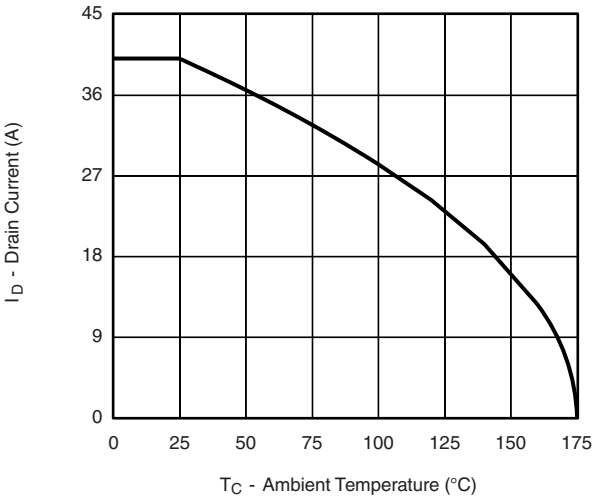


Source-Drain Diode Forward Voltage

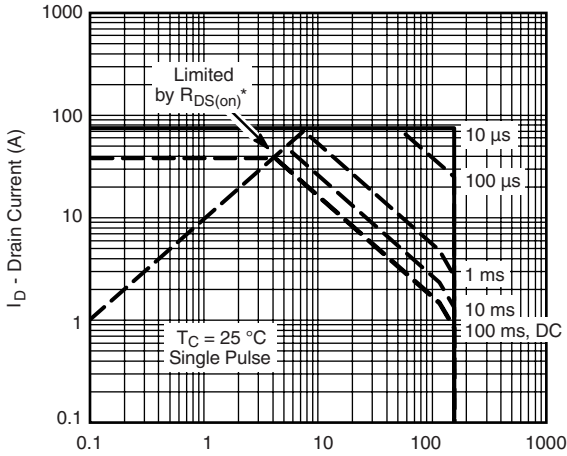


**Drain Source Breakdown
vs. Junction Temperature**

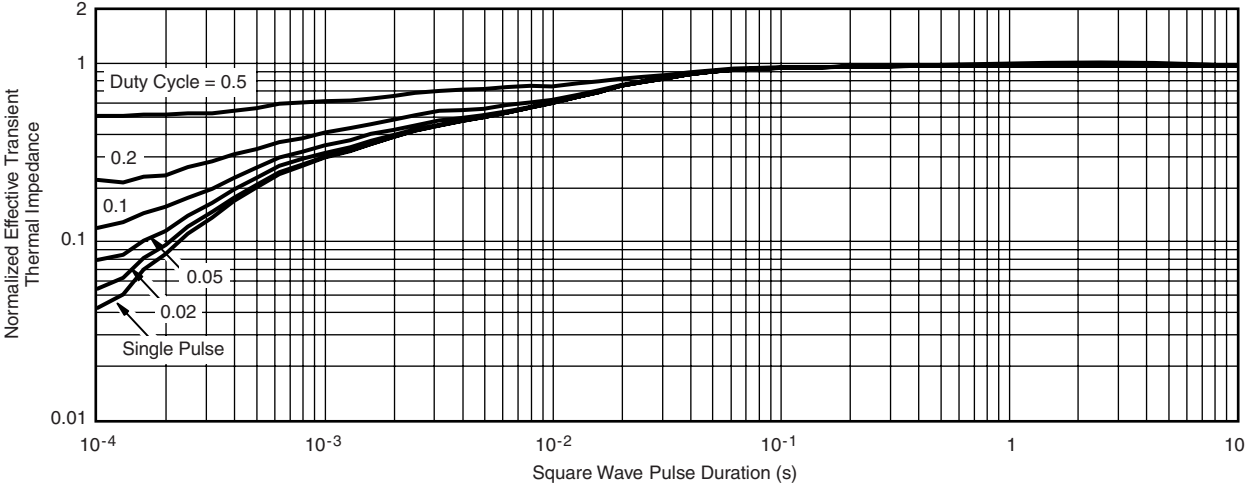
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

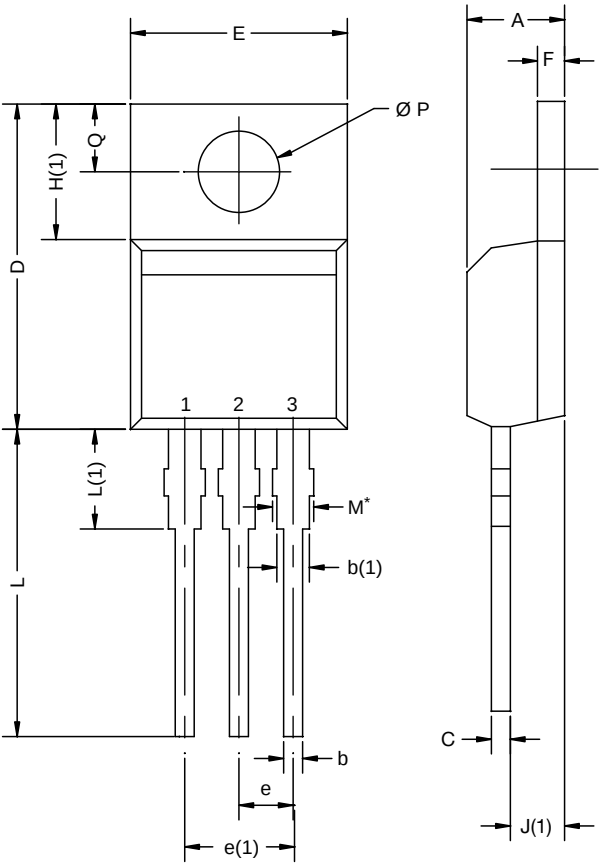


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
$\varnothing P$	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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