

650V 2A N-Channel Enhancement Mode Power MOSFET

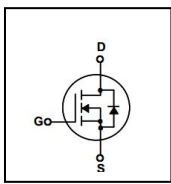
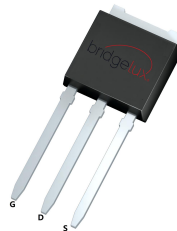
General Description

BXP2N65 is Bridgelux high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

FEATURES

- $R_{DS(ON)} \leq 5 \Omega$ @ $V_{GS}=10V, I_D=1A$
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

SYMBOL


SOT-223-3L

TO-251L

TO-252

ASSEMBLY MESSAGE

Product Name	Marking	Package	Packaging
BXP2N65N	BXP2N65	SOT-223-3L	Reel
BXP2N65U	BXP2N65	TO-251L	Tube
BXP2N65D	BXP2N65	TO-252	Tube/Reel

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Rating		Unit
		BXP2N65U/D	BXP2N65N	
Drain-Source Voltage	V_{DSS}	650		V
Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	2		A
	Continuous ($T_C = 100^\circ\text{C}$)	1.21		A
Drain Current	Pulsed (Note1)	8		A
Gate-Source Voltage	V_{GSS}	± 30		V
Avalanche Energy	Single Pulse (Note2)	75		mJ
	Repetitive (Note1)	6.5		mJ
Avalanche Current (Note1)	I_{AR}	1.1		A
Peak Diode Recovery dv/dt (Note3)	dv/dt	5		V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	44	3	W
	Derate above 25°C	0.35	0.024	W/ $^\circ\text{C}$
Maximum Junction Temperature	T_J	150		$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150		$^\circ\text{C}$

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. $L=37.5\text{mH}$, $V_{DD}=50\text{V}$, $R_G=25 \Omega$, Starting $T_J = 25^\circ\text{C}$

3. $I_{SD} \leq 2.0\text{A}$, $di/dt \leq 300\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.		Unit
		BXP2N65U/D	BXP2N65N	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.85	41.7	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	100	°C / W

ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise Noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1	μA	
		$V_{DS}=520V, T_C = 125^{\circ}\text{C}$			100	μA	
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=30V$			100	nA	
Gate-Body Leakage Current, Reverse		$V_{GS}=-30V$			-100	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250 \mu A$		0.62		$V/^{\circ}\text{C}$	
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V	
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1A$		4.2	5	Ω	
Forward Transconductance (Note4)	g_{FS}	$V_{DS} = 50V, I_D = 1A$		1.8		S	
DYNAMIC PARAMETERS							
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		325		pF	
Output Capacitance	C_{OSS}				30		pF
Reverse Transfer Capacitance	C_{RSS}				5.2		pF
SWITCHING PARAMETERS							
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=325V, I_D=2A, V_{GS} = 10V, R_G=10\Omega$ (Note4,5)		7		ns	
Turn-ON Rise Time	t_R			5		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			26		ns	
Turn-OFF Fall-Time	t_F			10.5		ns	
Total Gate Charge(Note5)	Q_G	$V_{DS} = 520V, V_{GS} = 10V, I_D = 2A$ (Note4,5)		8.5		nC	
Gate Source Charge	Q_{GS}			1.5		nC	
Gate Drain Charge	Q_{GD}			4		nC	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=2A, V_{GS}=0V$			1.4	V	
Diode Continuous Forward Current	I_S				2	A	
Pulsed Drain-Source Current	I_{SM}				8	A	
Reverse Recovery Time	t_{RR}	$V_{GS} = 0V, I_{SD} = 2A$		400		ns	
Reverse Recovery Charge	Q_{RR}	$di/dt=100A/\mu s$ (Note4,5)		1.15		μC	

Note: 4. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

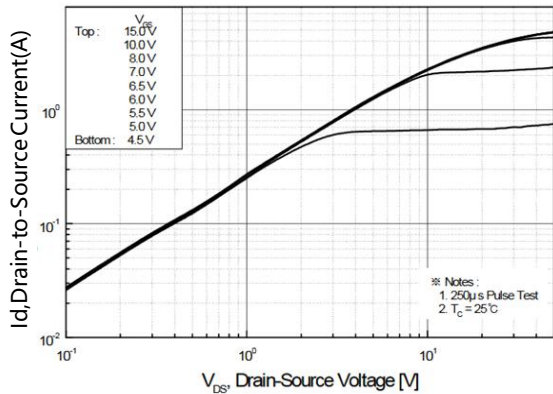


Figure1. Typical Output Characteristics

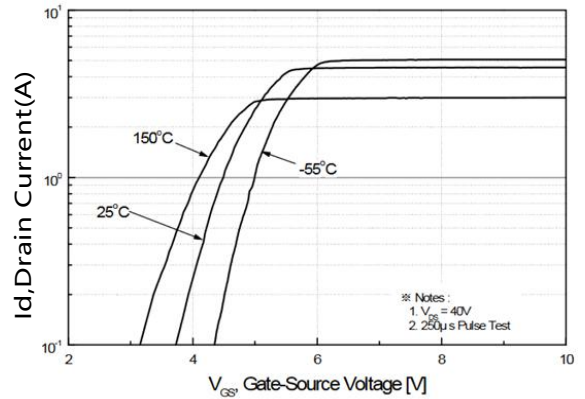


Figure2. Typical Transfer Characteristics

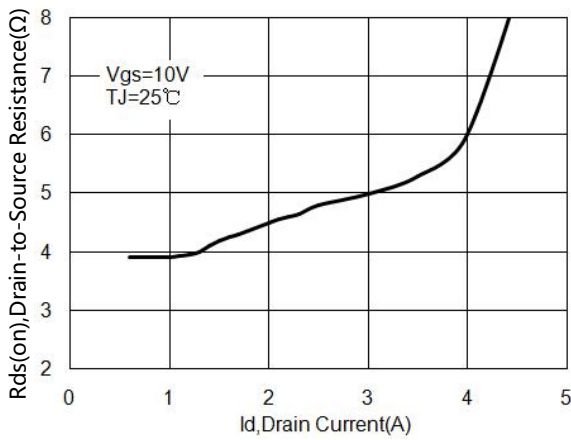


Figure3. On-Resistance versus Drain Current

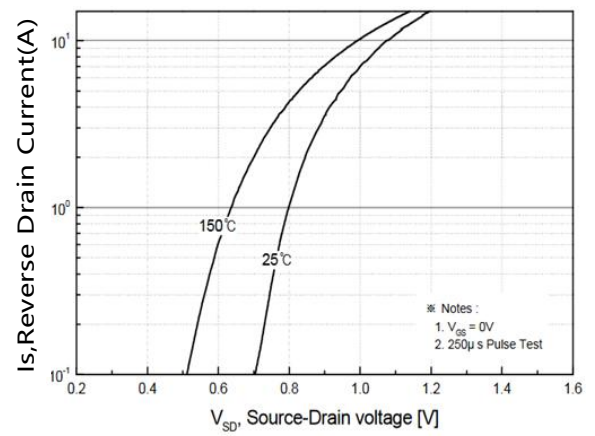


Figure4. Diode forward voltage versus Current

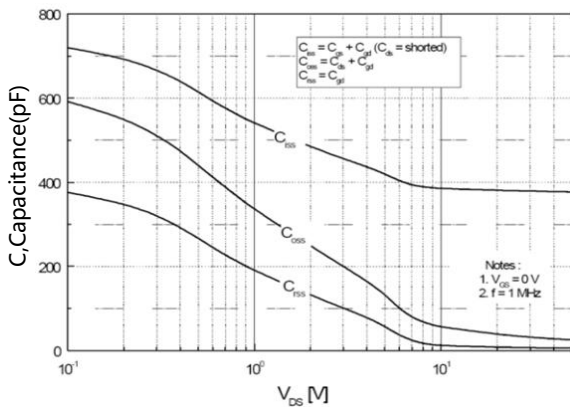


Figure5. Typical Capacitance versus VDS

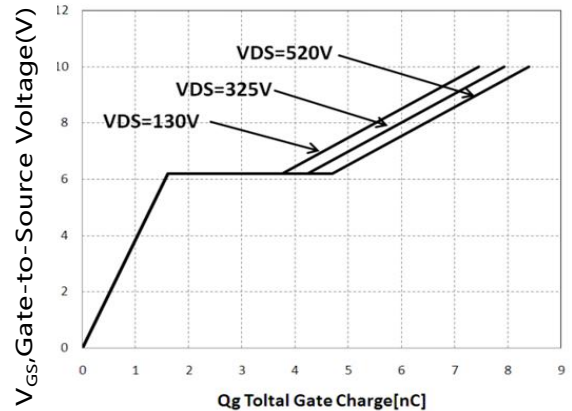


Figure6. Typical Gate Charge versus VGS

TYPICAL CHARACTERISTICS(Cont.)

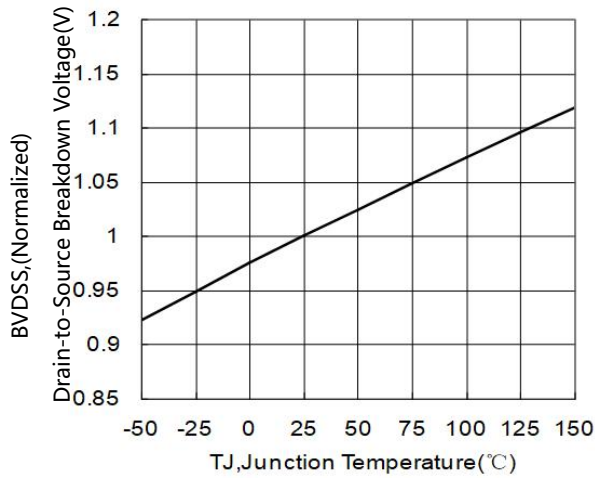


Figure7. BV_{DSS} Variation with Temperature

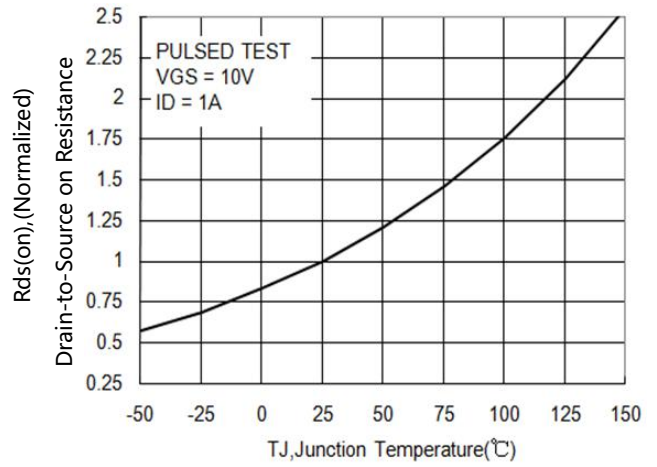


Figure8. On-Resistance Variation with Temperature

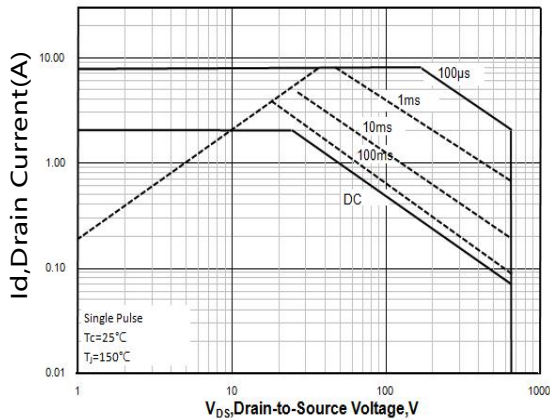


Figure9. Maximum Safe Operating Area

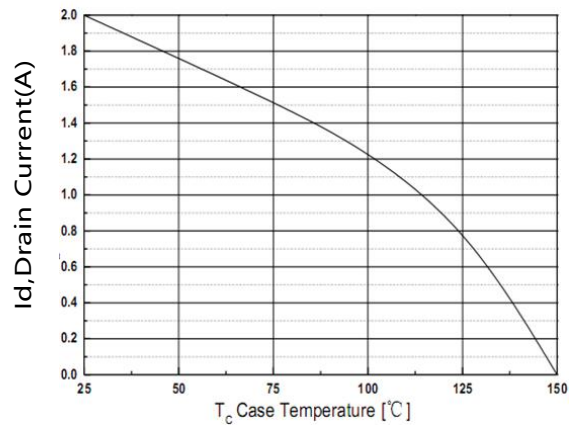
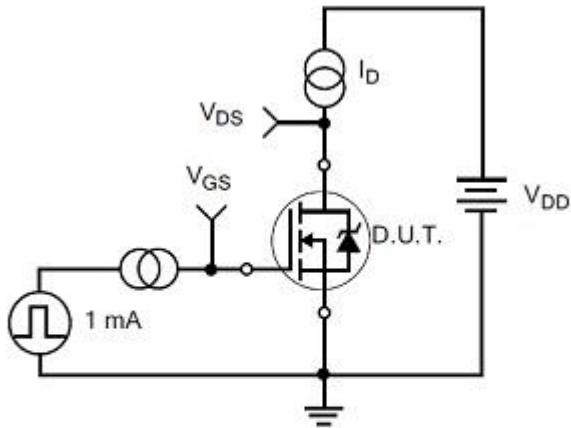
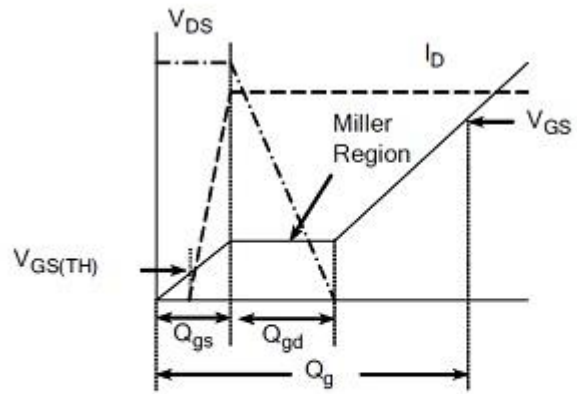


Figure10. Maximum Continuous Drain Current versus Case Temperature

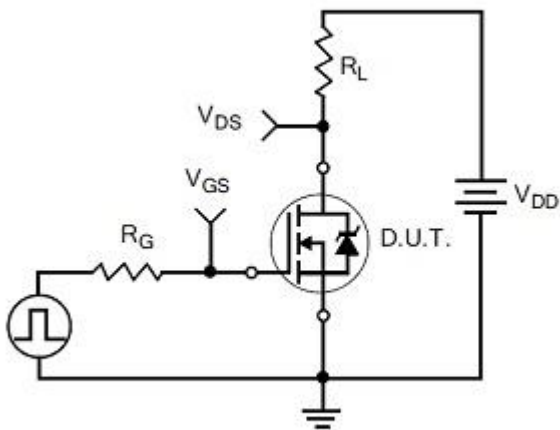
TEST CIRCUITS AND WAVEFORMS



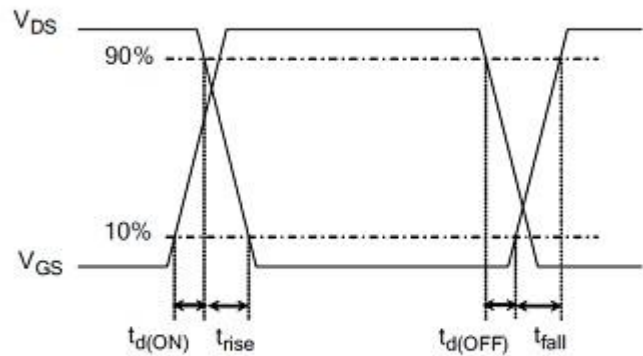
Gate Charge Test Circuit



Gate Charge Waveform

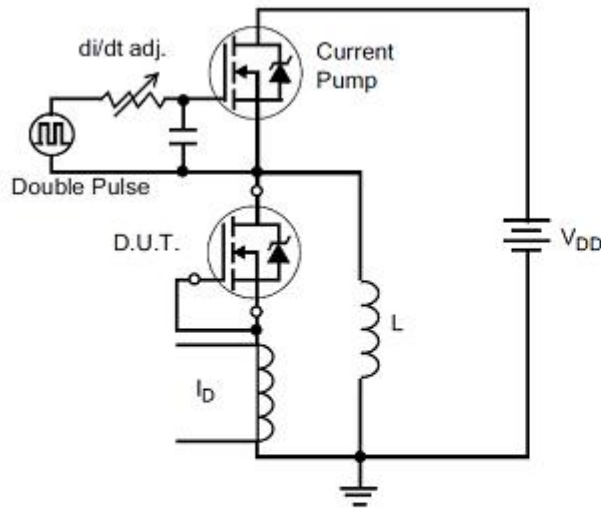


Resistive Switching Test Circuit

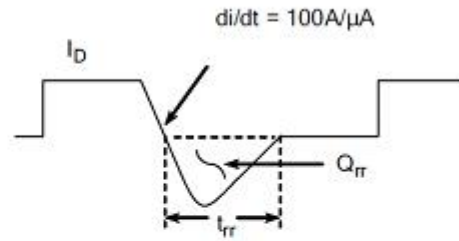


Resistive Switching Waveforms

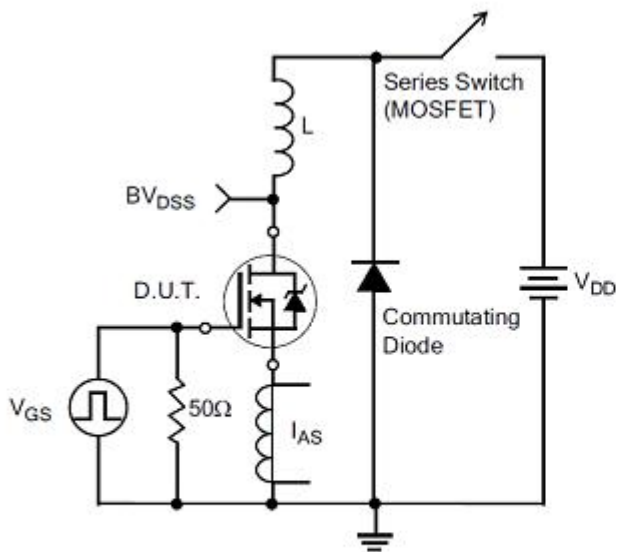
TEST CIRCUITS AND WAVEFORMS(Cont.)



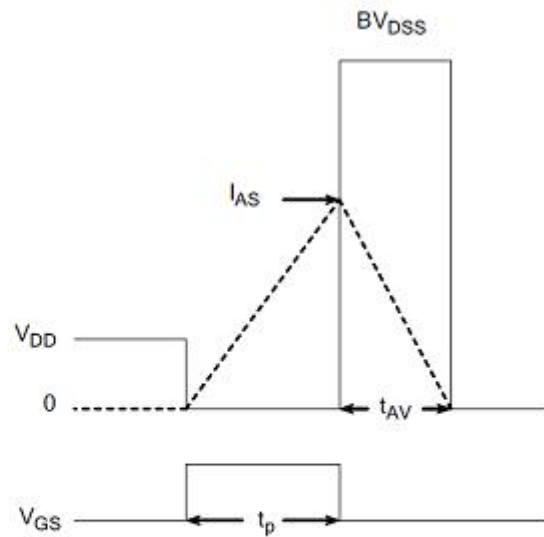
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



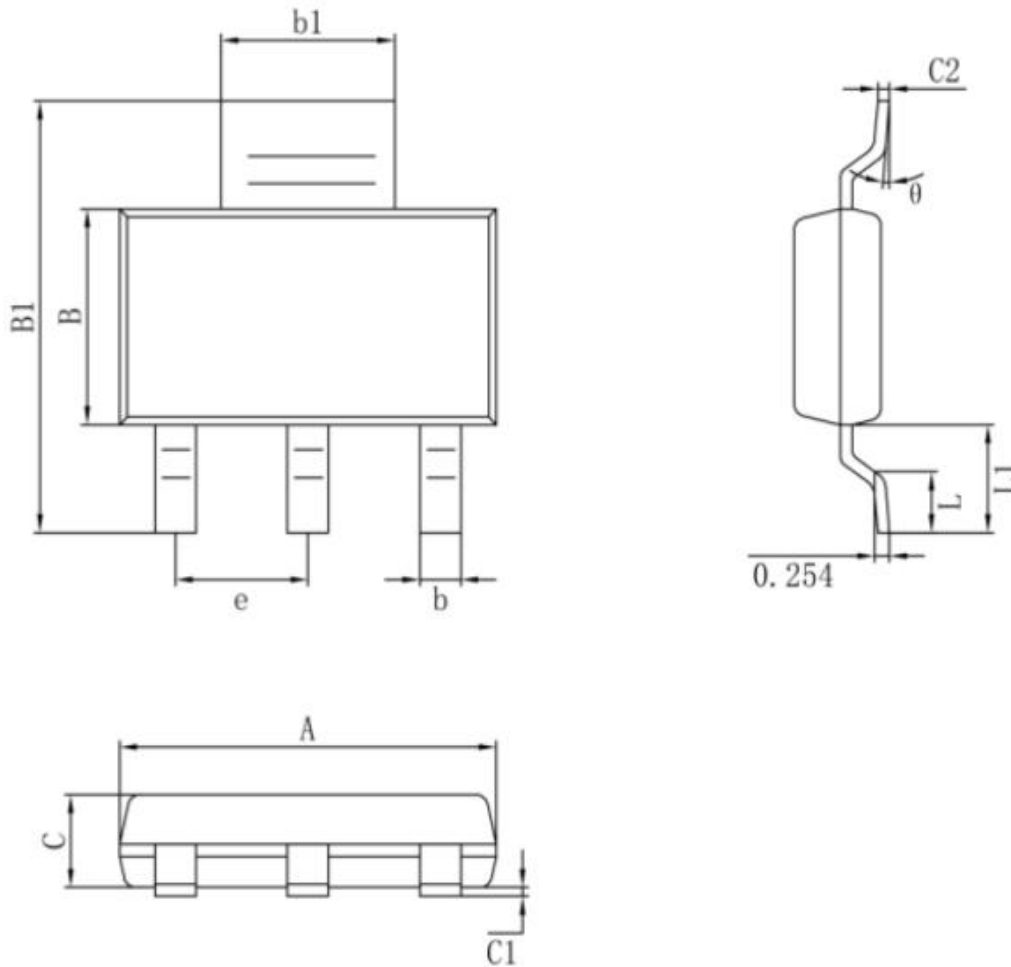
Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

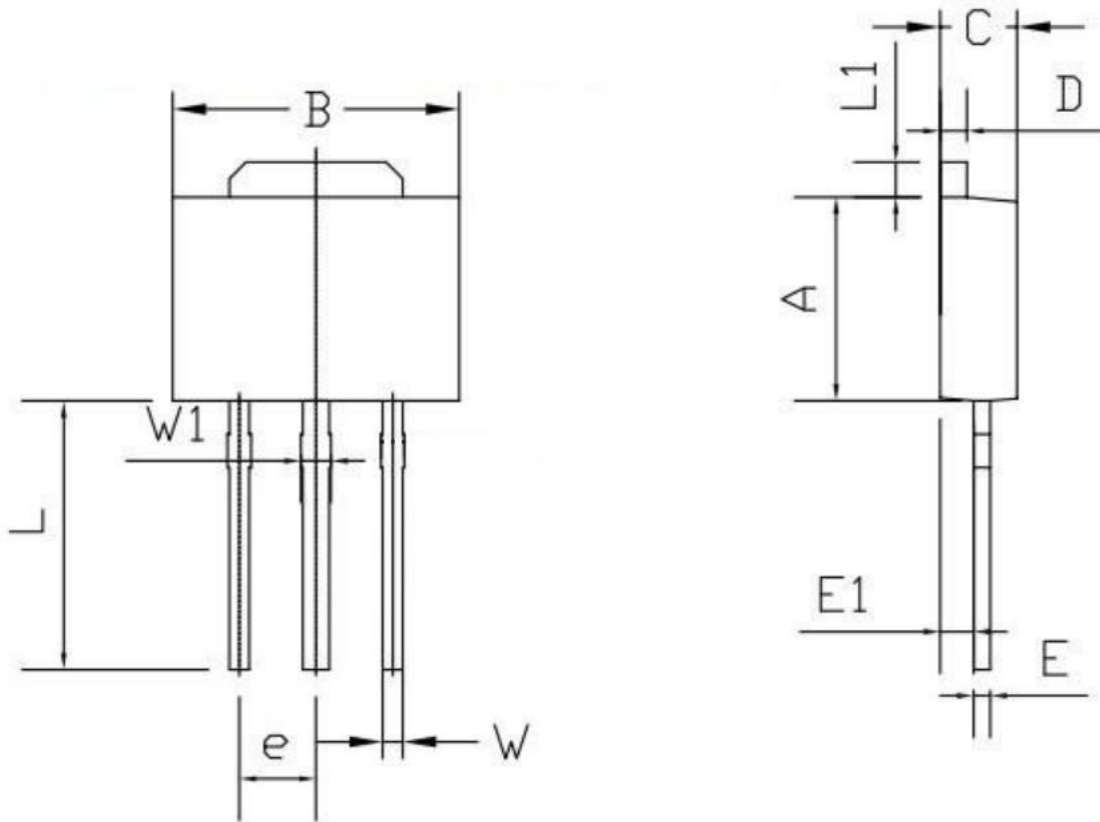
Unclamped Inductive Switching Waveforms

SOT-223-3L Package



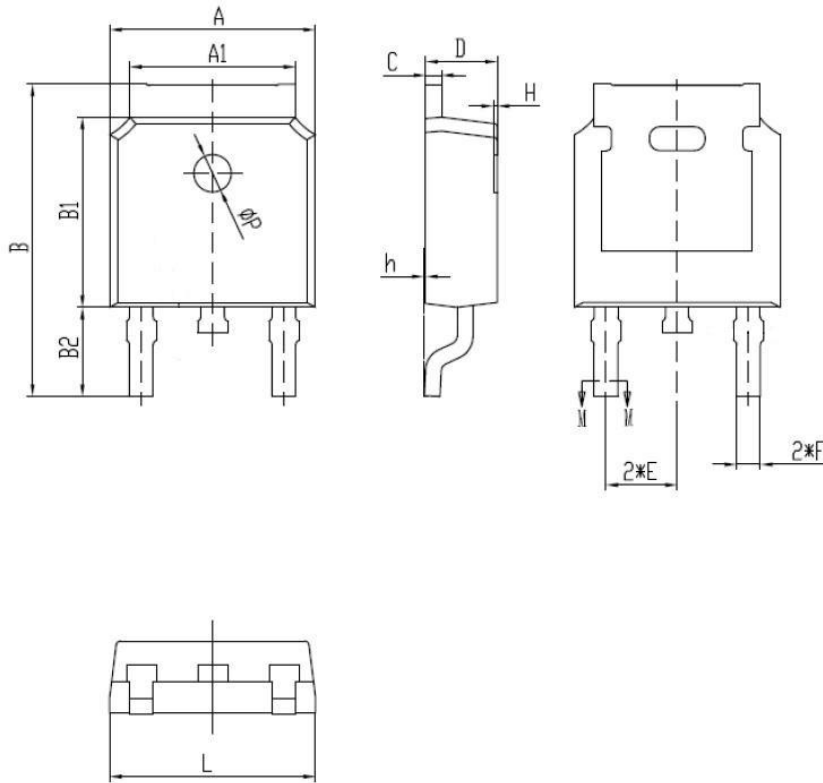
Dimensions In Millimeters			
Symbol	Min	Max	Note
A	6.20	6.60	
e	2.28-2.30typ		
b	0.66	0.82	
b1	2.90	3.10	
B	3.30	3.70	
B1	6.83	7.15	
C	1.45	1.80	
C1	0.00	0.15	
C2	0.20	0.35	
L	0.76	1.16	
θ	0°	10°	

TO-251 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	6.00	6.20	0.235	0.245
B	6.45	6.70	0.253	0.264
C	2.05	2.55	0.080	0.101
D	0.70	0.90	0.027	0.036
E	0.49	0.53	0.019	0.021
E1	0.97	1.20	0.038	0.048
e	2.28	2.31	0.089	0.091
L	9.11	9.55	0.358	0.376
L1	0.92	1.55	0.036	0.062
W	0.65	0.95	0.025	0.038
W1	0.75	1.35	0.029	0.054

TO-252 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	6.50	6.70	0.255	0.264
A1	5.25	5.38	0.206	0.212
B	9.80	10.40	0.385	0.410
B1	6.00	6.20	0.236	0.245
B2	2.70	3.10	0.106	0.123
C	0.49	0.52	0.019	0.021
D	2.20	2.40	0.086	0.095
E	2.18	2.39	0.085	0.095
F	0.74	0.80	0.029	0.032
H	0.00	0.30	0.000	0.012
h	0.00	0.13	0.000	0.006
L	6.50	6.70	0.255	0.264
φ P	1.10	1.30	0.043	0.052

Revision history

Document revision history

Date	Revision	Changes
16-Mar-2021	1.0	First release
28-Jul-2021	1.1	Corrected parameter
18-Aug-2021	1.2	Add POD
11-Oct-2021	2.0	Update package type
11-Nov-2021	2.1	Update POD
5-Jan-2022	2.2	Update parameter

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