30V P-Channel Power MOSFET

DESCRIPTION

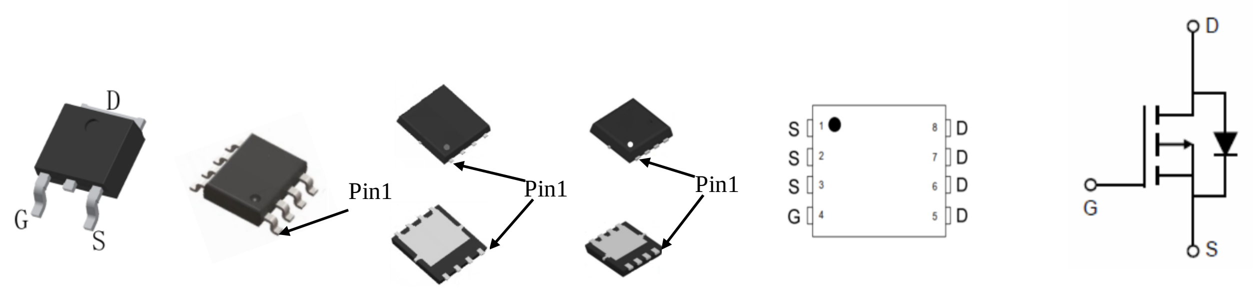
The BLM10P03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

Application

- Power switching application
- Hard switched and High frequency circuits
- Battery Protection

KEY CHARACTERISTICS

- V_{DS} = -30V,I_D = -24A (PDFN3.3*3.3)
  I_D = -30A(PDFN5*6)
  I_D = -15A (SOP8)
  I_D = -40A (TO-252)
  $R_{DS(ON)}$ < 10mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ < 15mΩ @ V_{GS}=-4.5V
- High density cell design for lower Rdson
- Excellent package for good heat dissipation



TO-252-2L SOP8 PDFN 5*6 PDFN 3.3*3.3 Package Top View Schematic diagram

Package Marking And Ordering Information

Device Marking	Ordering Codes	Package	Product Code	Packing
M10P03	BLM10P03-D	TO-252-2L	BLM10P03	Tape Reel
M10P03	BLM10P03-R	PDFN3.3*3.3	BLM10P03	Tape Reel
M10P03	BLM10P03-E	SOP8	BLM10P03	Tape Reel
M10P03	BLM10P03-Q	PDFN5*6	BLM10P03	Tape Reel

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D（PDFN3.3*3.3）	-24	A
	I_D（PDFN5*6）	-30	A
	I_D（SOP8）	-15	A
	I_D（TO-252）	-40	A
Drain Current-Pulsed (Note 1)	I_{DM}（PDFN3.3*3.3）	-96	A
	I_{DM}（PDFN5*6）	-120	A
	I_{DM}（SOP8）	-60	A
	I_{DM}（TO-252）	-160	A

Maximum Power Dissipation(Tc=25℃)	P_D（PDFN3.3*3.3）	8.4	W
	P_D（PDFN5*6）	13	W
	P_D（SOP8）	3.3	W
	P_D（TO-252）	23.2	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient	$R_{\theta JC}$（PDFN3.3*3.3）	15.0	℃/W
	$R_{\theta JC}$（PDFN5*6）	9.6	℃/W
	$R_{\theta JC}$（SOP8）	38.3	℃/W
	$R_{\theta JC}$（TO-252）	5.4	℃/W

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.5	-2.4	V
Drain-Source On-State Resistance(Note 2)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-17A	-	8	10	mΩ
		V_{GS}=-4.5V, I_D=-13A	-	12	15	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-17A	-	43	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, *f*=1.0MHz	-	2000	-	pF
Output Capacitance	C_{oss}		-	290	-	pF
Reverse Transfer Capacitance	C_{rss}		-	270	-	pF
Switching Characteristics (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, ID=-17A, V_{GS}=-10V,R_{GEN}=3Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	43	-	nS
Turn-Off Fall Time	t_f			18	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-17A V_{GS}=-10V	-	36	-	nC
Gate-Source Charge	Q_{gs}		-	5.3	-	nC
Gate-Drain Charge	Q_{gd}		-	8.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=-1 A	-	-	-1.2	V

Notes:
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production.

Characteristics Curves

Figure 1 Output Characteristics

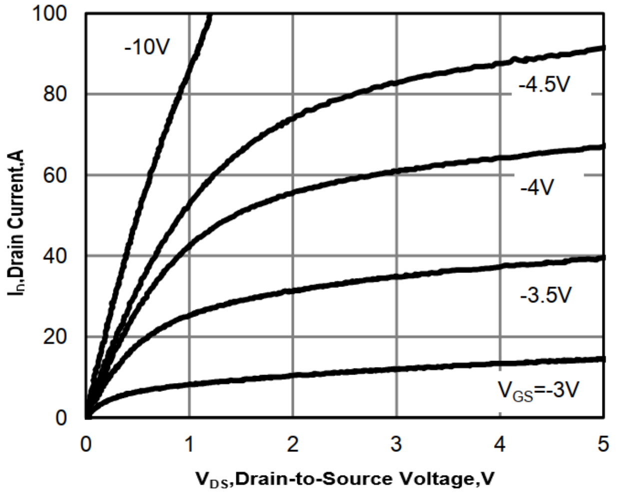


Figure 2 Transfer Characteristics

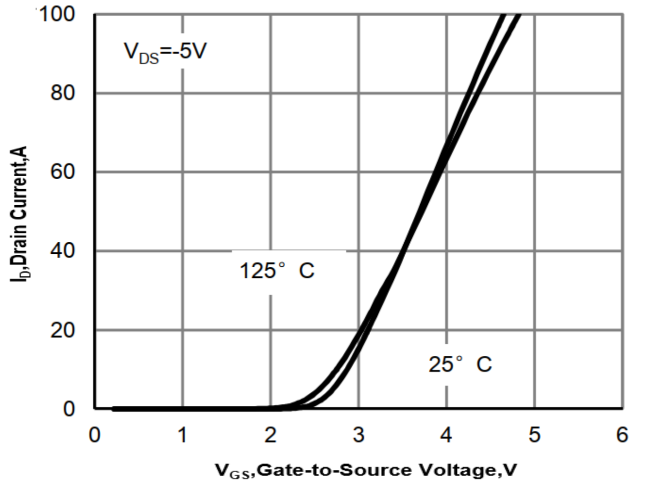


Figure 3 On-Resistance vs. I_D and V_{GS}

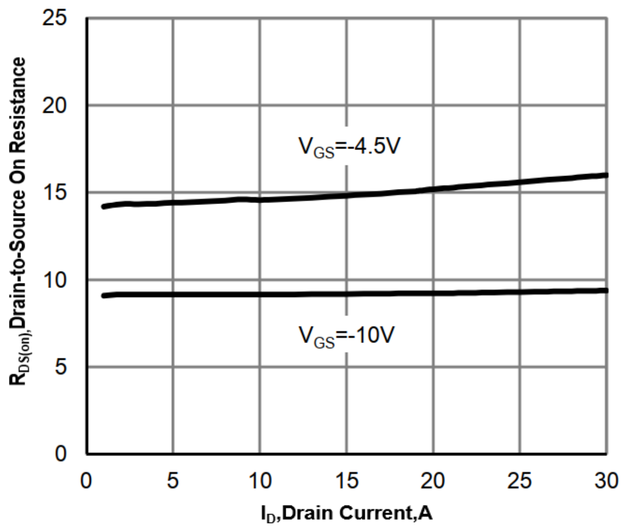


Figure 4 On-Resistance vs. Junction Temperature

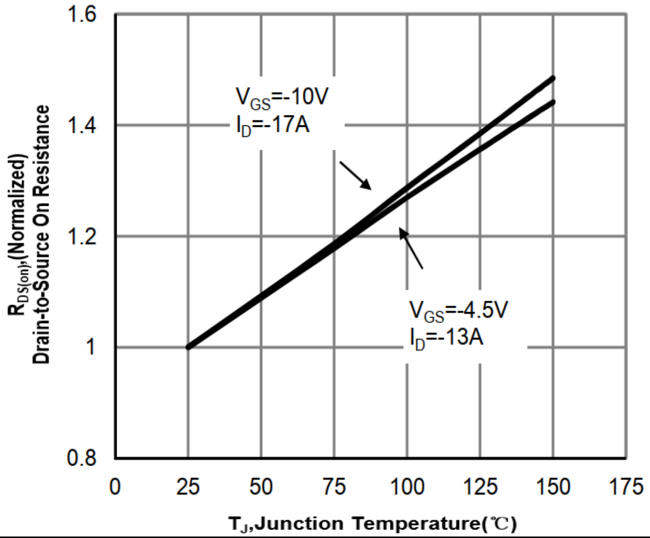


Figure 5 On-Resistance vs. V_{GS}

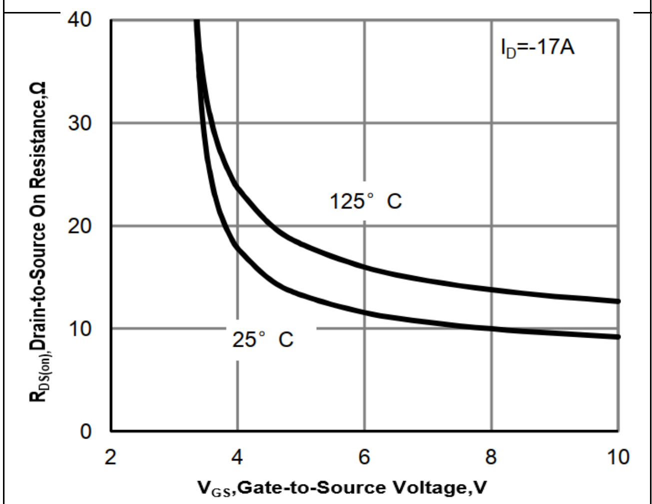


Figure 6 Body Diode Forward Voltage

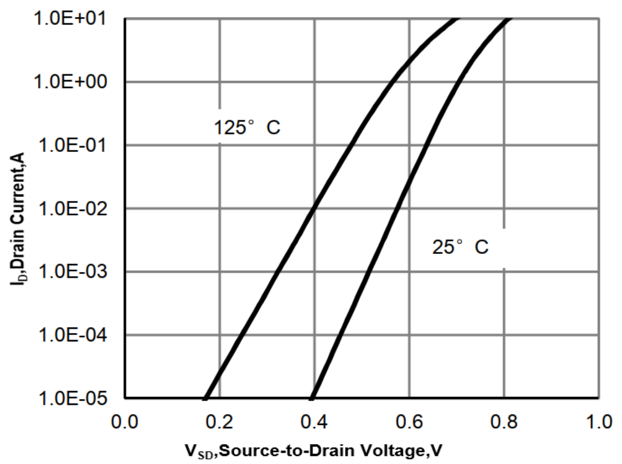


Figure 7 Gate-Charge Characteristics

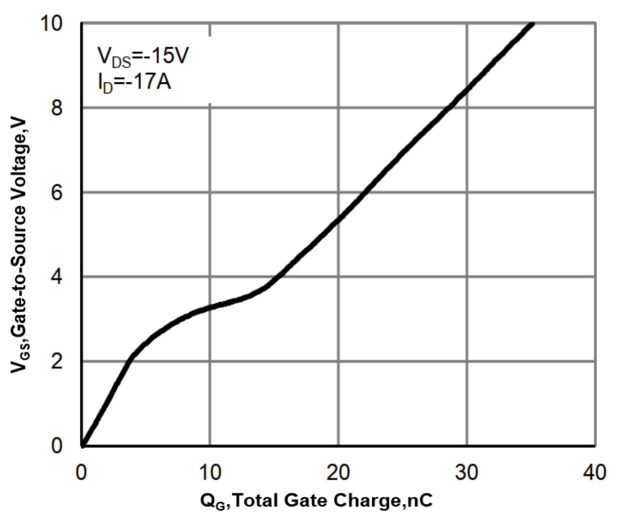


Figure 8 Capacitance Characteristics

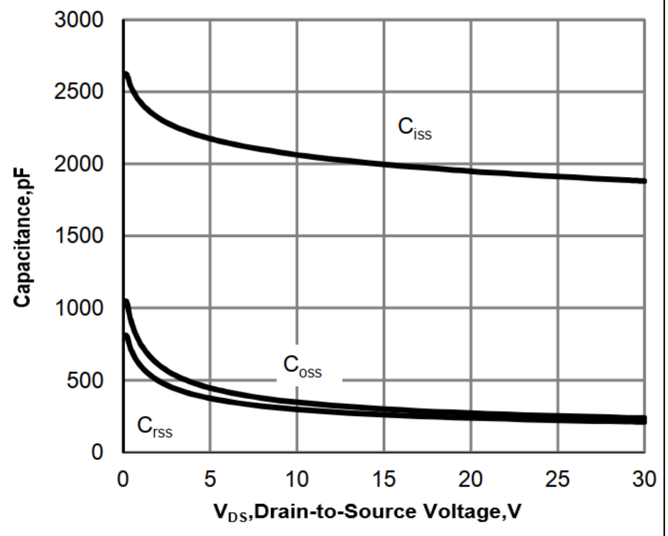


Figure 9a Maximum Forward Biased Safe Operation Area（PDFN3.3*3.3）

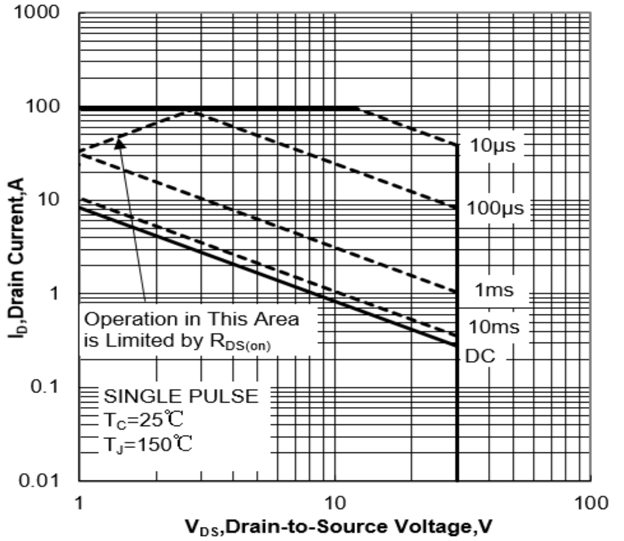


Figure9b Maximum Forward Biased Safe Operation Area（PDFN5*6）

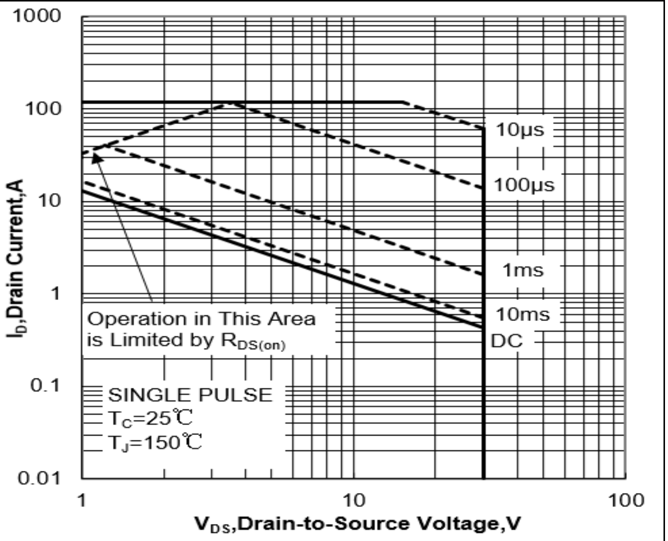


Figure 9c Maximum Forward Biased Safe Operation Area（SOP8）

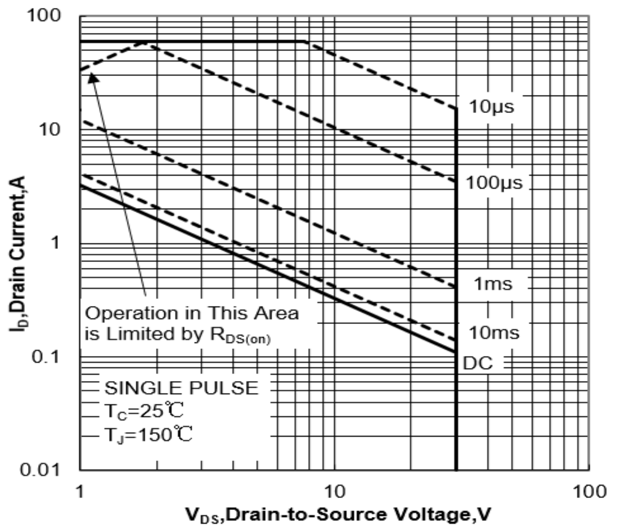


Figure 9d Maximum Forward Biased Safe Operation Area（TO-252）

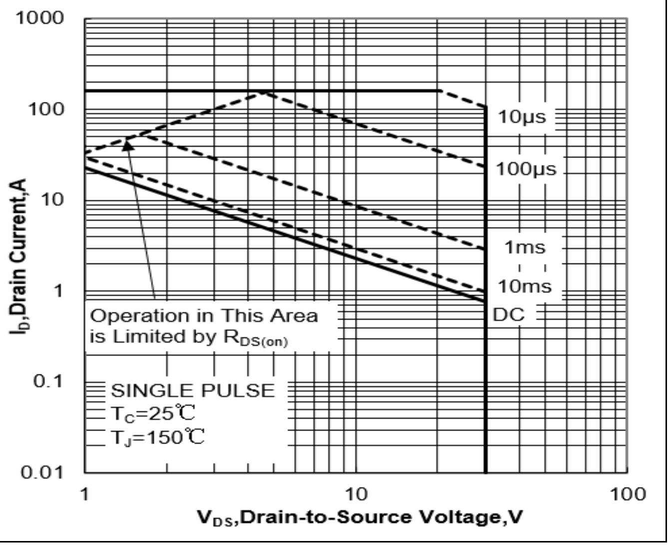


Figure 10a Single Pulse Power Rating Junction-to-Ambient（PDFN3.3*3.3）

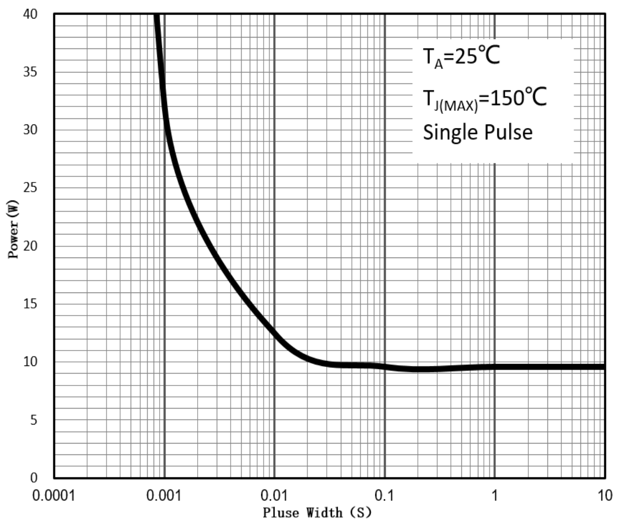


Figure 10b Single Pulse Power Rating Junction-to-Ambient（PDFN5*6）

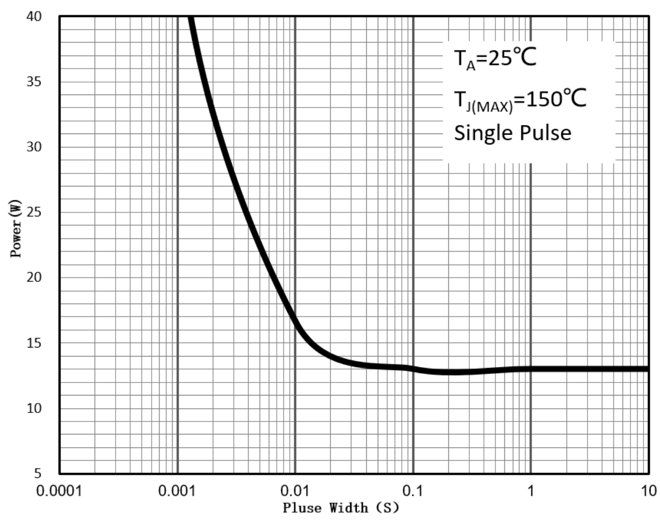


Figure 10c Single Pulse Power Rating Junction-to-Ambient（SOP8）

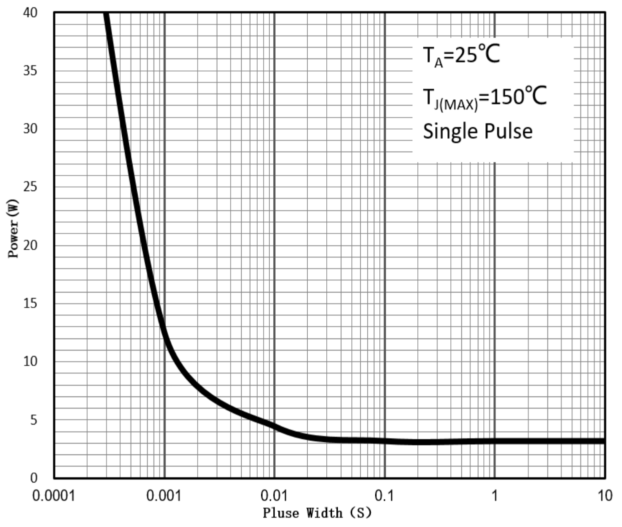


Figure 10d Single Pulse Power Rating Junction-to-Ambient（TO-252）

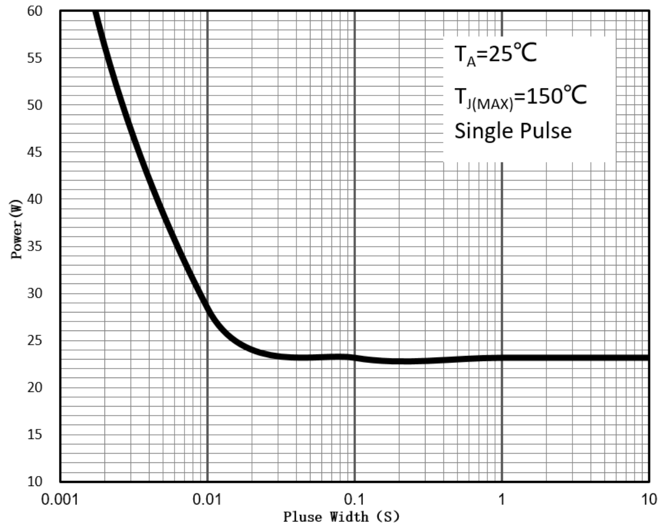


Figure 11a Normalized Maximum Transient Thermal Impedance（PDFN3.3*3.3）

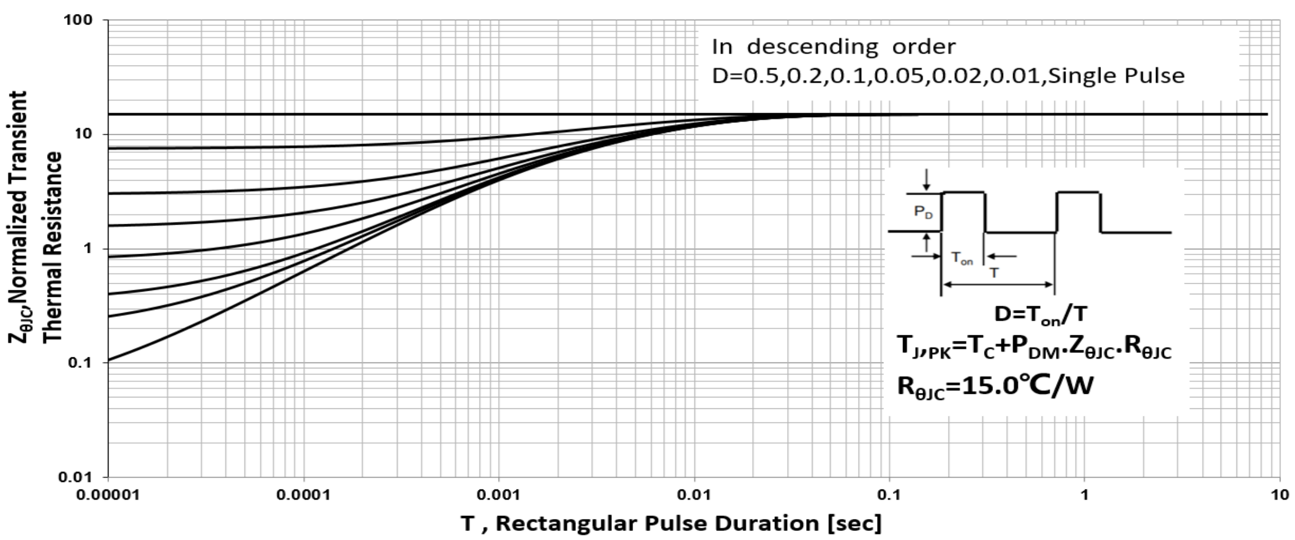


Figure 11b Normalized Maximum Transient Thermal Impedance（PDFN 5*6）

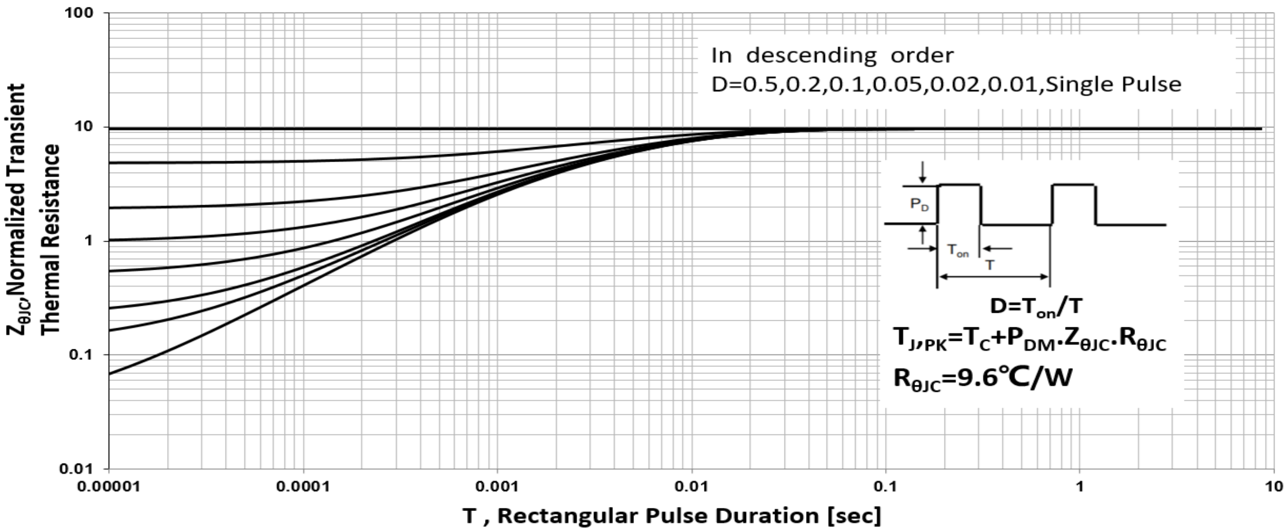


Figure 11c Normalized Maximum Transient Thermal Impedance（SOP8）

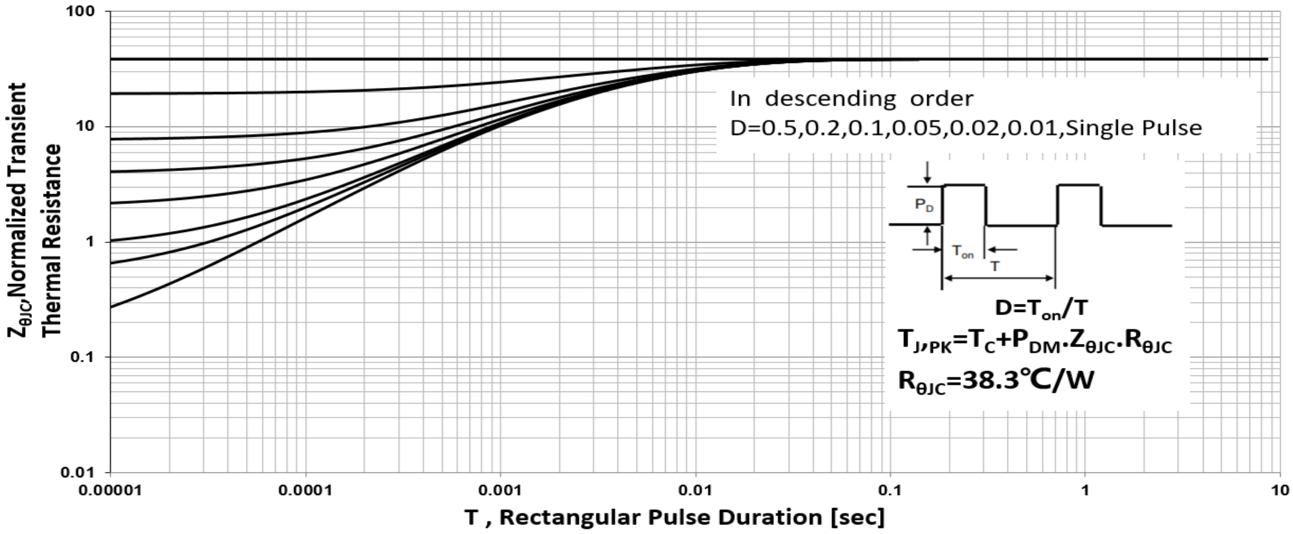
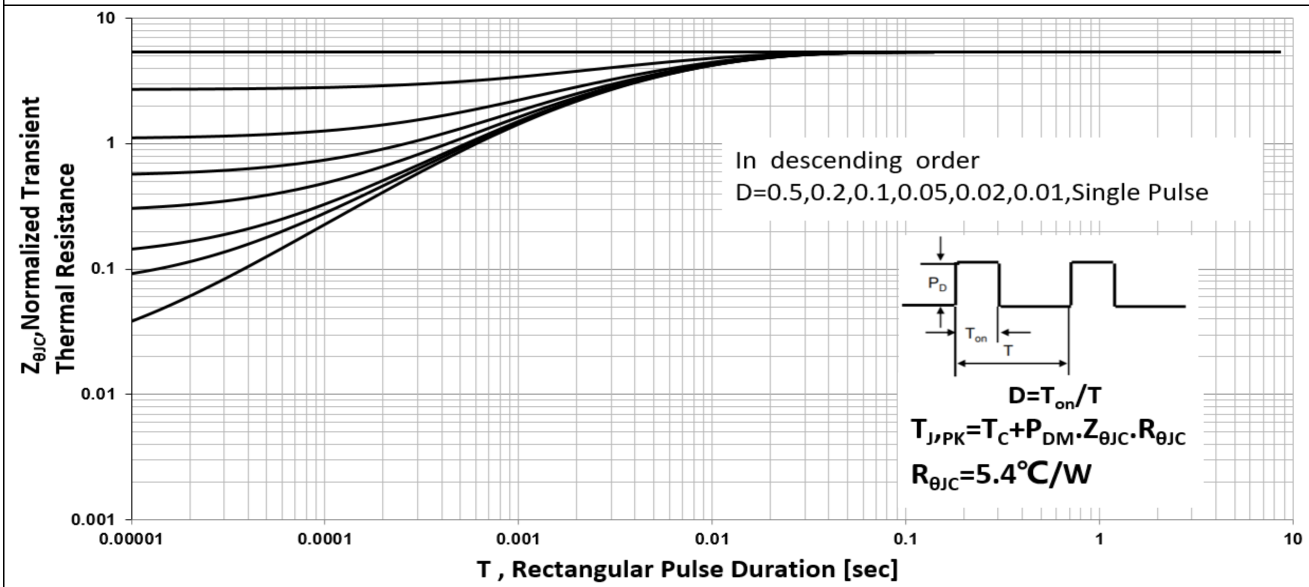
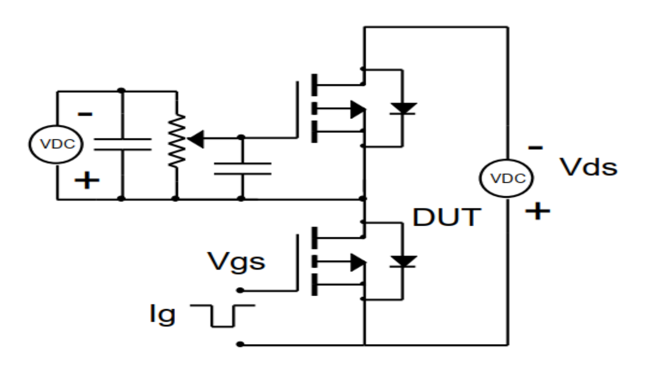


Figure 11d Normalized Maximum Transient Thermal Impedance（TO-252）

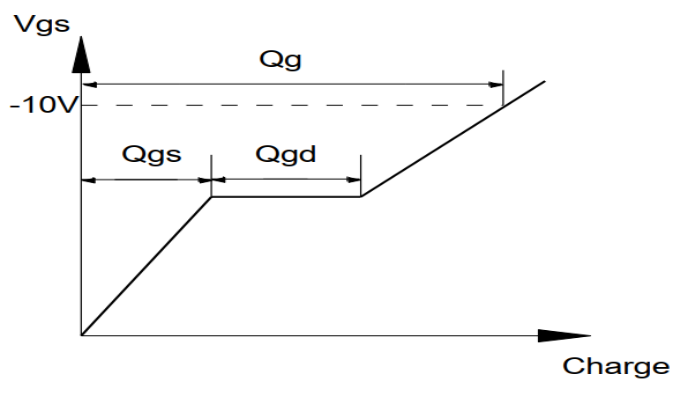


Test Circuit and Waveform

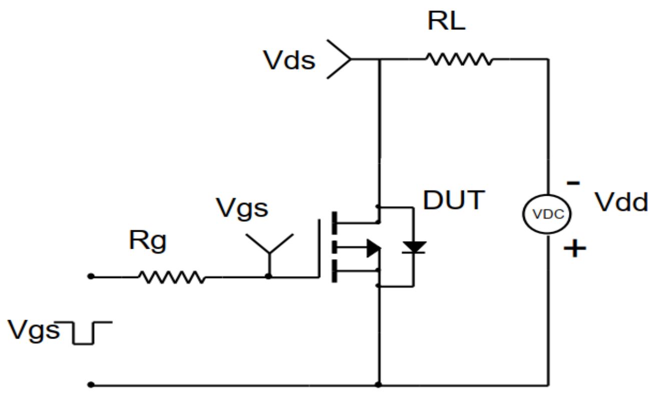
Gate Charge Test Circuit



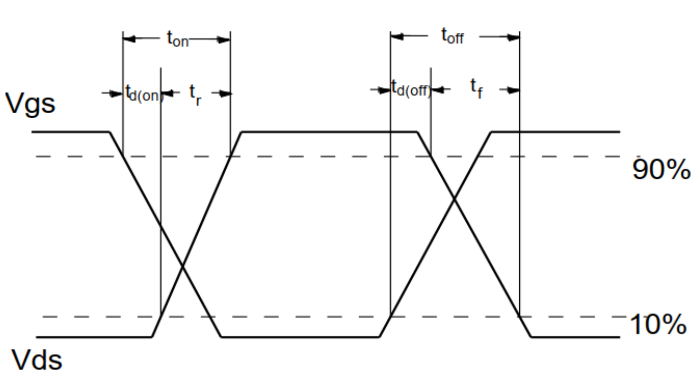
Gate Charge Test Waveform



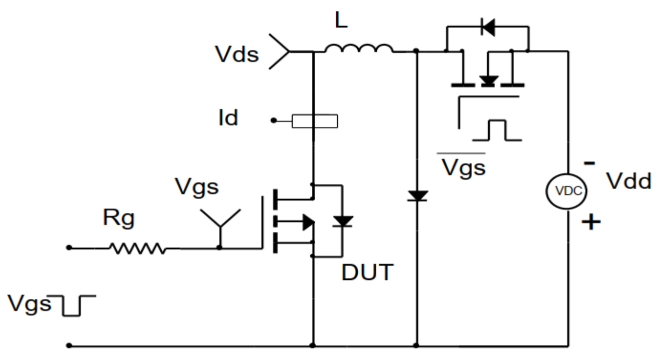
Resistive Switching Test Circuit



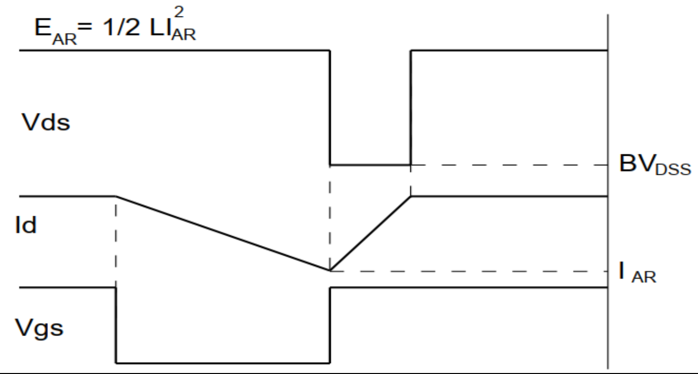
Resistive Switching Test Waveforms



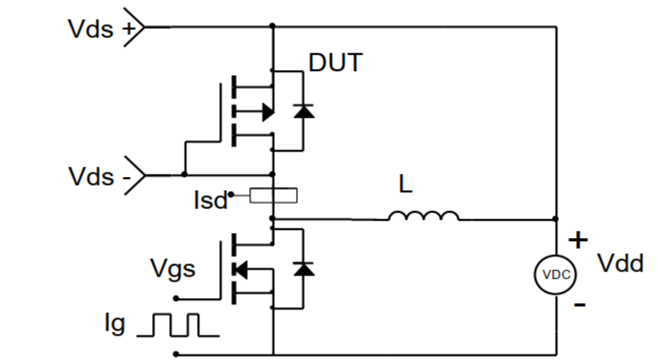
Unclamped Inductive Switching (UIS) Test Circuit



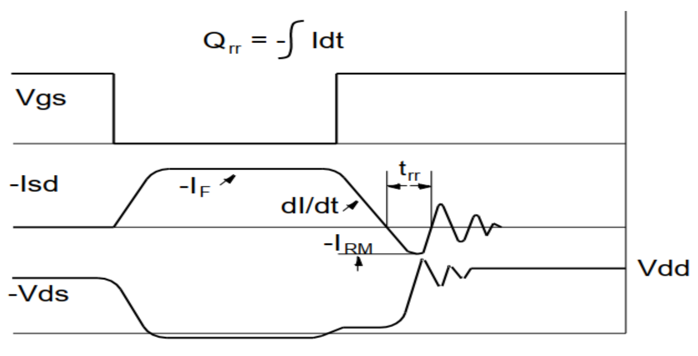
Unclamped Inductive Switching (UIS) Test Waveforms



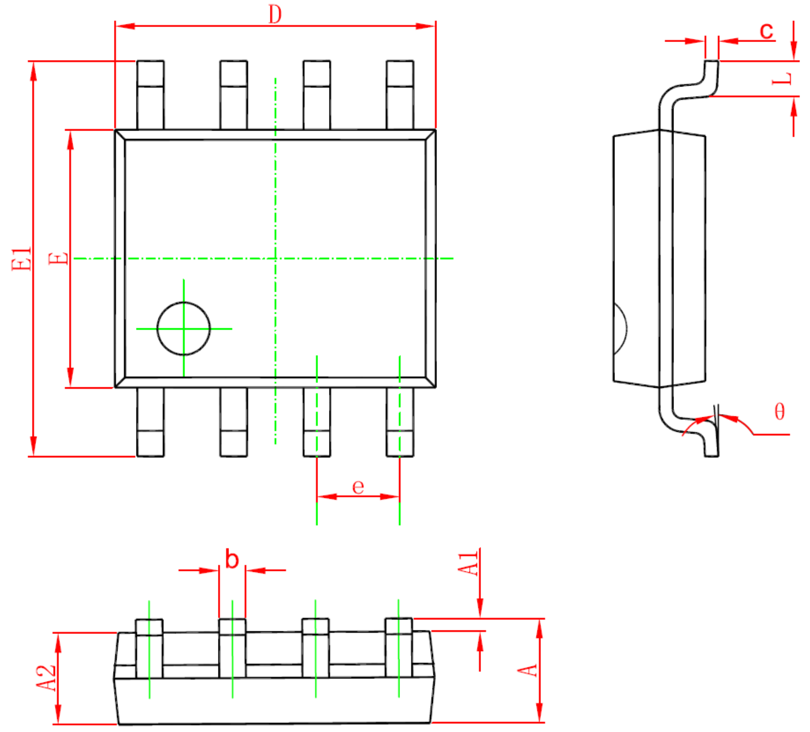
Diode Recovery Test Circuit



Diode Recovery Test Waveforms

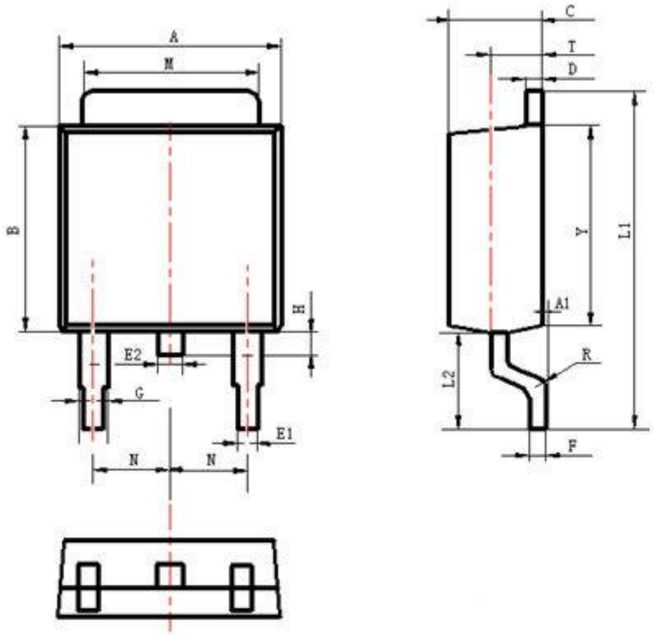


Package Description



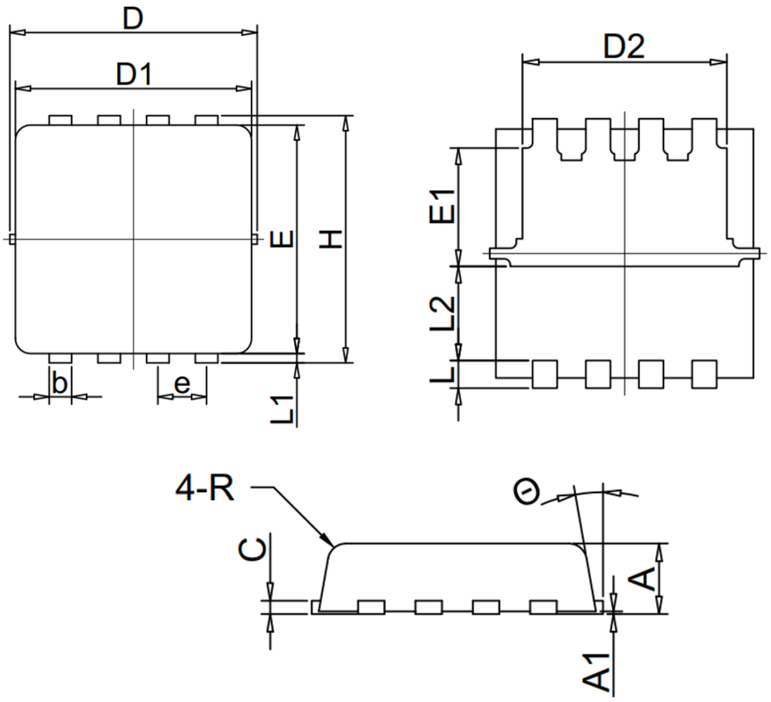
Symbol	Dimensions Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270（BSC）		0.050（BSC）	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

SOP8 Package



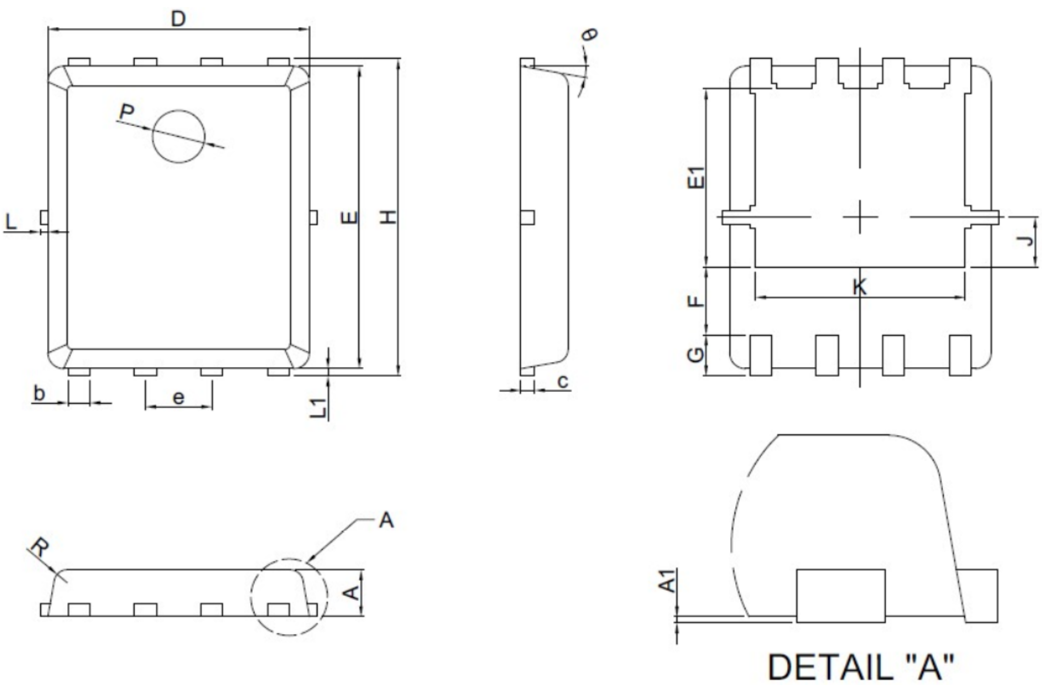
Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
A1	0	0.13
B	5.70	6.30
C	2.10	2.50
D	0.30	0.60
E1	0.60	0.90
E2	0.70	1.00
F	0.30	0.60
G	0.70	1.20
L1	9.60	10.50
L2	2.70	3.10
H	0.60	1.00
M	5.10	5.50
N	2.09	2.49
R	0 .3	
T	1.40	1.60
Y	5.10	6.30

TO-252-2L Package



SYMBOL	MIN	NOM	MAX
A	0.70	0.80	0.90
A1	0.00	0.03	0.05
b	0.24	0.30	0.35
c		0.152REF	
D	3.25	3.32	3.40
D1	3.05	3.15	3.25
D2	2.40	2.50	2.60
E	3.00	3.10	3.20
E1	1.35	1.45	1.55
e		0.65BSC	
H	3.20	3.30	3.40
L	0.30	0.40	0.15
L1	0.10	0.15	0.20
L2		1.13REF	
R		0.20REF	
θ	6°	10°	14°

PDFN3.3*3.3 Package



SYMBOL	MIN	NORMAL	MAX
A	0.8	0.9	1.0
A1	0.00	0.03	0.05
b	0.35	0.42	0.49
c	0.254REF		
D	4.9	5.0	5.1
F	1.40REF		
E	5.7	5.8	5.9
e	1.27BSC		
H	5.95	6.08	6.20
L1	0.10	0.14	0.18
G	0.60REF		
K	4.00REF		
L	-------	-------	0.15
J	0.95BSC		
P	1.00REF		
E1	3.35	3.40	3.65
θ	6°	10°	14°
R	0.25REF		

PDFN 5*6 Package

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shanghai Belling reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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