

1. Description

➤ Advantages

BLM15P04 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

➤ Key Characteristics

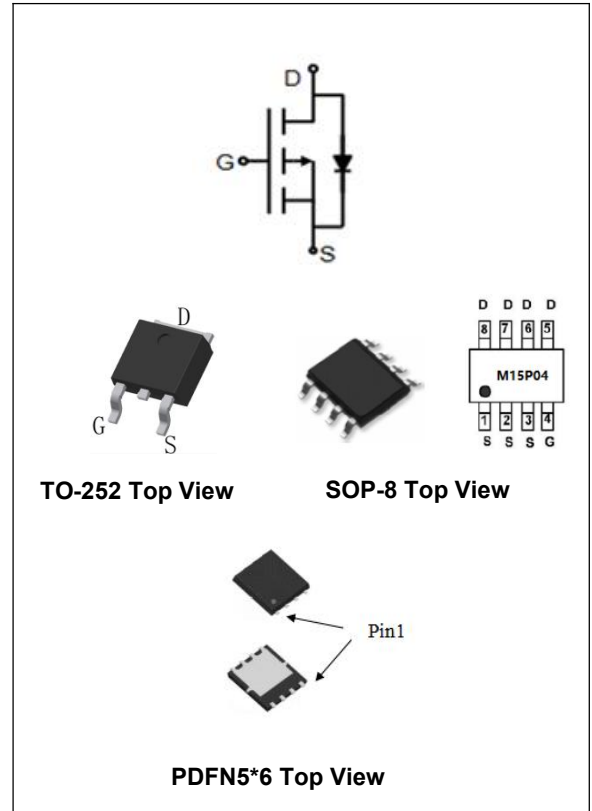
Parameter	Value	Unit
V_{DS}	-40	V
$I_D(TO-252)$	-40	A
$R_{DS(ON)}@10V_{Typ}$	11.5	mΩ
$R_{DS(ON)}@4.5V_{Typ}$	14.5	mΩ

➤ Features

- High power and current handing capability
- Lead free product is acquired
- 100% avalanche tested_(TO-252&PDFN5*6)
- RoHS product
- Surface mount package

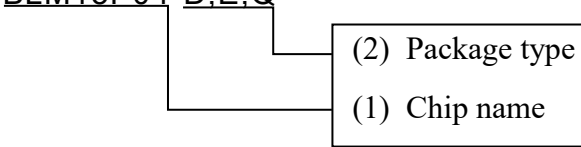
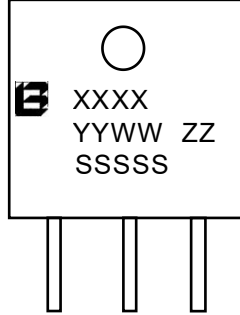
➤ Applications

- Load switch
- Power management



➤ Ordering Informations

Device Marking	Ordering Codes	Package	Product Code	Packing
M15P04	BLM15P04-D	TO-252	BLM15P04	Reel
M15P04	BLM15P04-E	SOP-8	BLM15P04	Reel
M15P04	BLM15P04-Q	PDFN5*6	BLM15P04	Reel

BLM15P04-D,E,Q  (1)BLM15P04:-40V 15mΩ (2)D:TO-252 E:SOP-8 Q:PDFN5*6	 XXXX: Device Marking YYWW: Year&Week ZZ: Assembly Code SSSSS: Lot Code
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2. Absolute Ratings

at $T_C = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Units
V_{DS}	Drain-to-Source Voltage	-40	V
$I_{D(TO-252)}$	Continuous Drain Current	-40	A
$I_{D(PDFN5*6)}$		-35	A
$I_{D(SOP-8)}$		-11	A
$I_{D(TO-252)}$	Continuous Drain Current $T_C = 100^\circ\text{C}$	-26	A
$I_{D(PDFN5*6)}$		-23	A
$I_{D(SOP-8)}$		-7	A
$I_{DM(TO-252)}$	Pulsed Drain Current(Note1)	-160	A
$I_{DM(PDFN5*6)}$		-140	A
$I_{DM(SOP-8)}$		-44	A
$P_{D(TO-252)}$	Power Dissipation	41	W
$P_{D(PDFN5*6)}$		32	W
$P_{D(SOP-8)}$		3.3	W
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy(Note2)	110	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$

3. Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC(TO-252)}$	Junction-to-Case	3	$^\circ\text{C/W}$
$R_{\theta JC(PDFN5*6)}$		3.8	$^\circ\text{C/W}$
$R_{\theta JA(SOP-8)}$	Junction-to-Ambient	38.3	$^\circ\text{C/W}$

4. Electrical Characteristics

at $T_C = 25^\circ\text{C}$, unless otherwise specified

OFF Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-40	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-40V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	--	--	1	μA
I_{GSS}	Gate to Source Forward Leakage	$V_{GS}=\pm 20V$	--	--	± 100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=-10V$, $I_D=-20A(\text{Note3})$	--	11.5	15	$m\Omega$
		$V_{GS}=-4.5V$, $I_D=-15A(\text{Note3})$	--	14.8	20	$m\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu A(\text{Note3})$	-1	-1.5	-2.4	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
R_g	Gate resistance	$f=1.0\text{MHz}$	--	6.7	--	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-20V$ $f=1.0\text{MHz}$	--	3900	--	pF
C_{oss}	Output Capacitance		--	300	--	
C_{rss}	Reverse Transfer Capacitance		--	280	--	

Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -1A$ $V_{DD} = -20V$ $V_{GS} = -10V$ $R_G = 6\Omega$	--	50	--	ns
t_r	Rise Time		--	450	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	200	--	
t_f	Fall Time		--	90	--	
Q_g	Total Gate Charge	$I_D = -20A$ $V_{DS} = -20V$ $V_{GS} = -10V$	--	86	--	nC
Q_{gs}	Gate to Source Charge		--	12	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	17	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$I_{S(TO-252)}$	Continuous Source Current (Body Diode)	$T_C = 25\text{ }^{\circ}C$	--	--	-40	A
V_{SD}	Diode Forward Voltage	$I_S = -30A$, $V_{GS} = 0V(\text{Note3})$	--	--	-1.2	V

Note1: Pulse width limited by maximum junction temperature

Note2: Eas condition: $V_g = -10V$, $L = 0.5mH$, $V_{ds} = -20V$, Start $T_J = 25^{\circ}C$, $I_{as} = -21A$

Note3: Pulse width $t_p \leq 300\mu s$, $\delta \leq 2\%$

5. Characteristics Curves

Figure 1 Output Characteristics

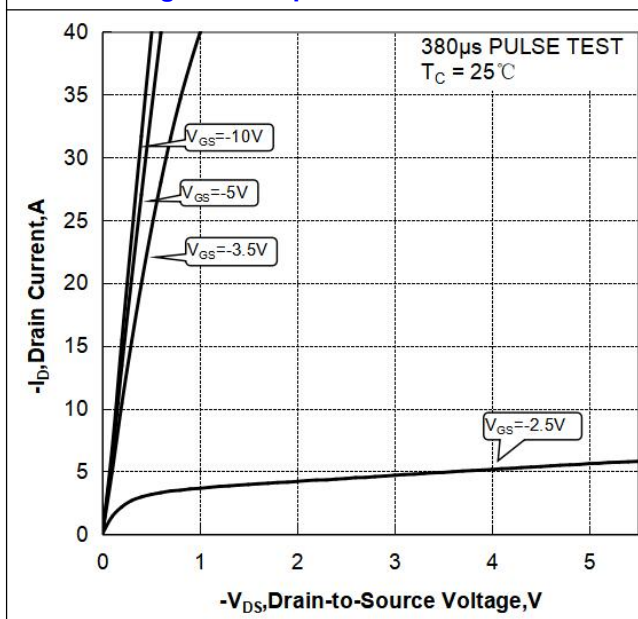


Figure 2 Transfer Characteristics

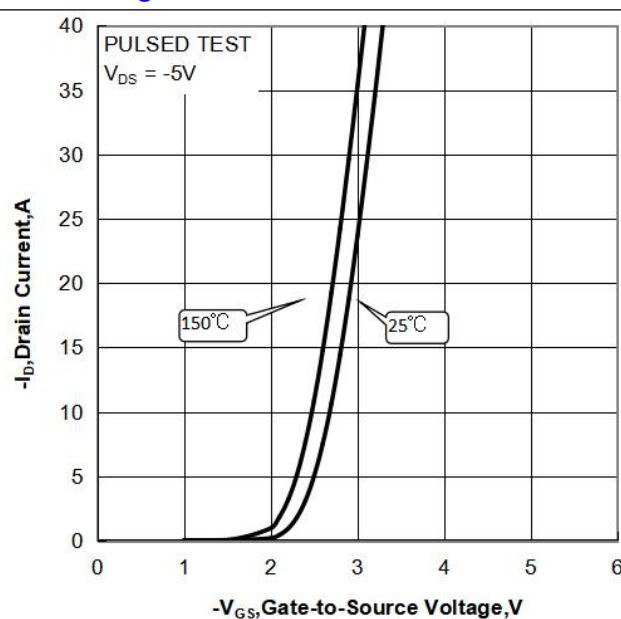


Figure 3 On-Resistance vs. I_D

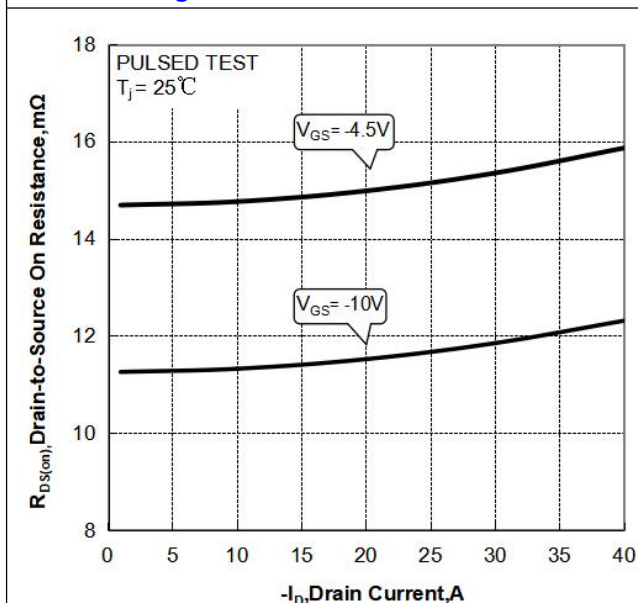


Figure 4 On-Resistance vs. Junction Temperature

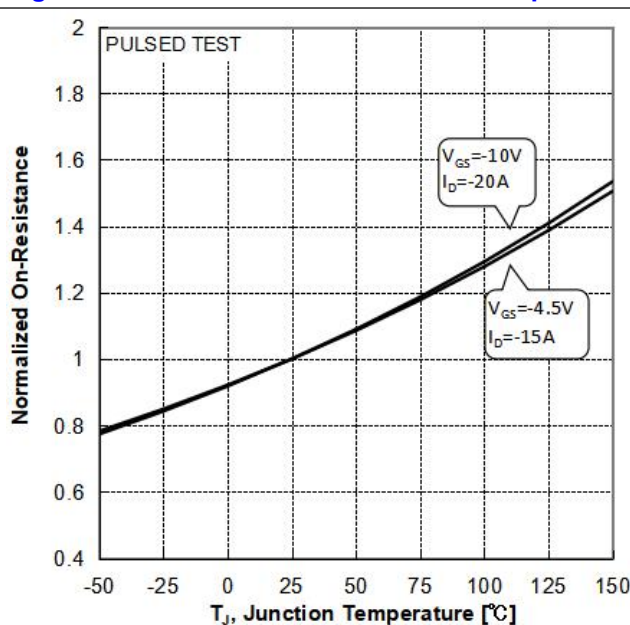


Figure 5 BV vs Junction Temperature

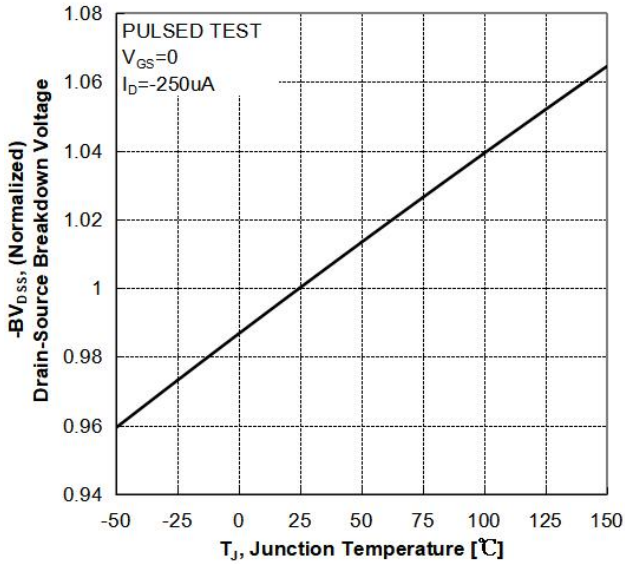


Figure 6 Vth vs Junction Temperature

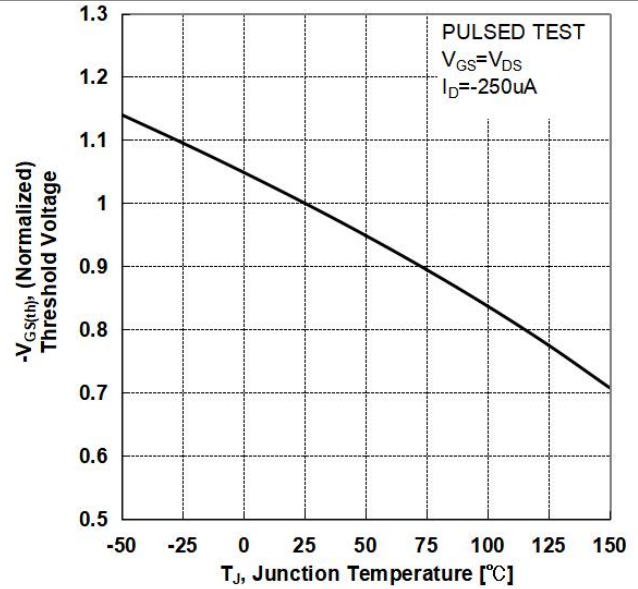


Figure 7 Gate-Charge Characteristics

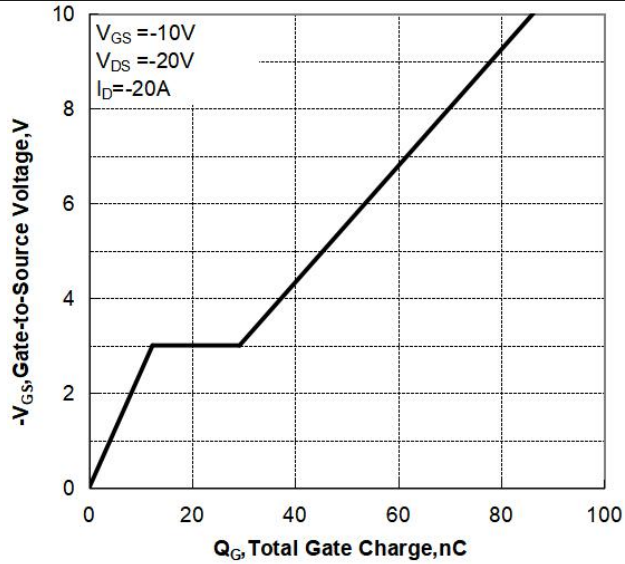


Figure 8 Capacitance Characteristics

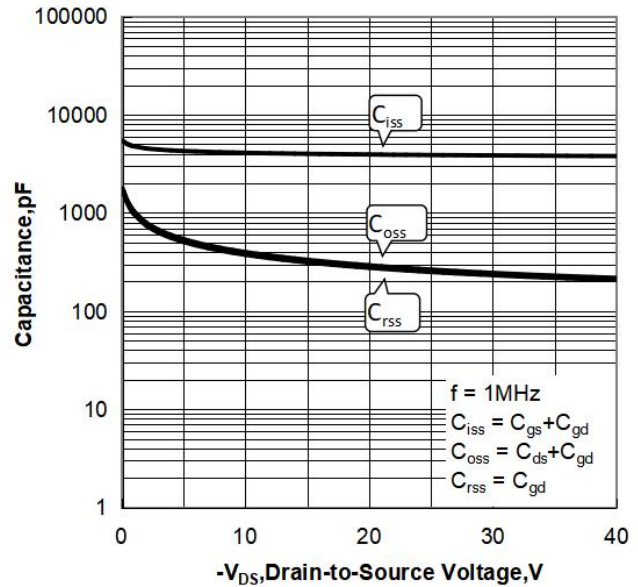


Figure 9 Body Diode Forward Voltage

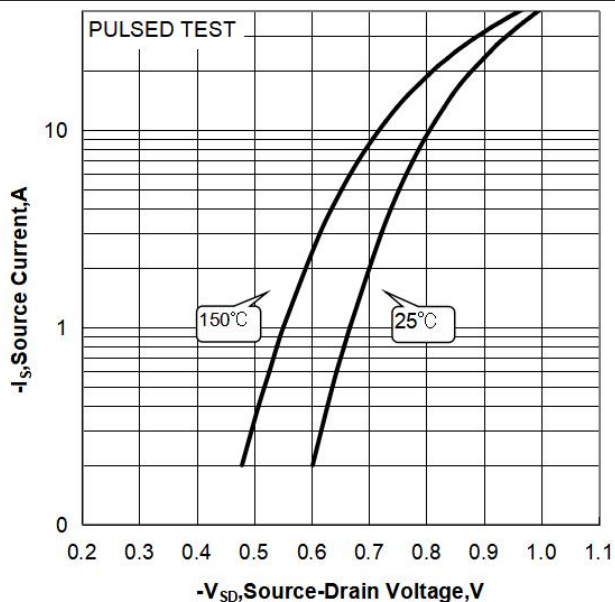


Figure 10a Maximum Safe Operating Area (TO-252)

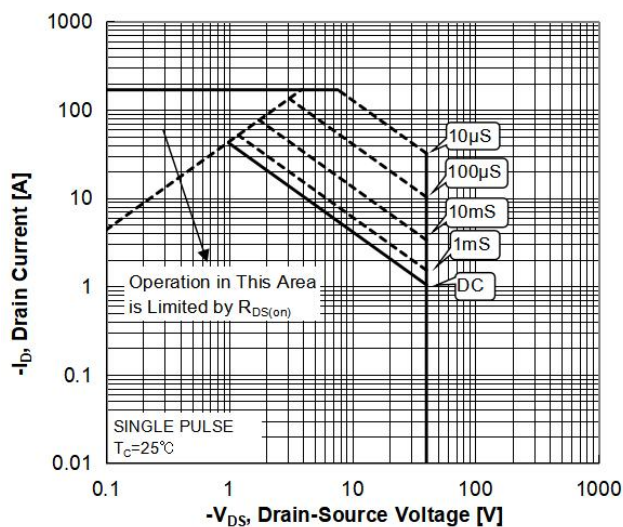


Figure 10b Maximum Safe Operating Area (PDFN5*6)

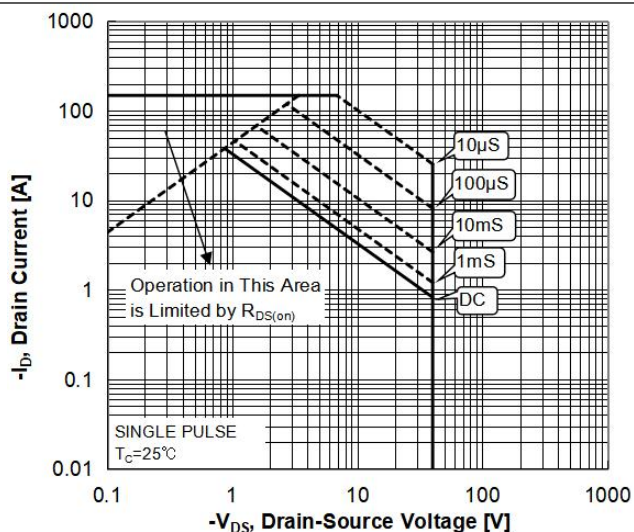


Figure 10c Maximum Safe Operating Area (SOP-8)

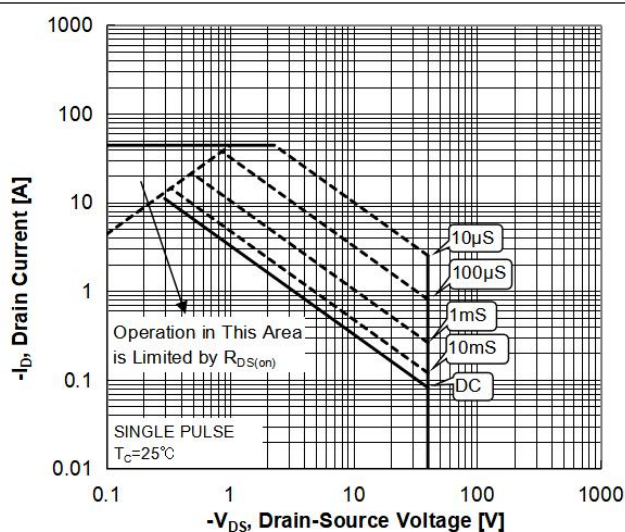


Figure 11 Transient Thermal Impedance_(TO-252)

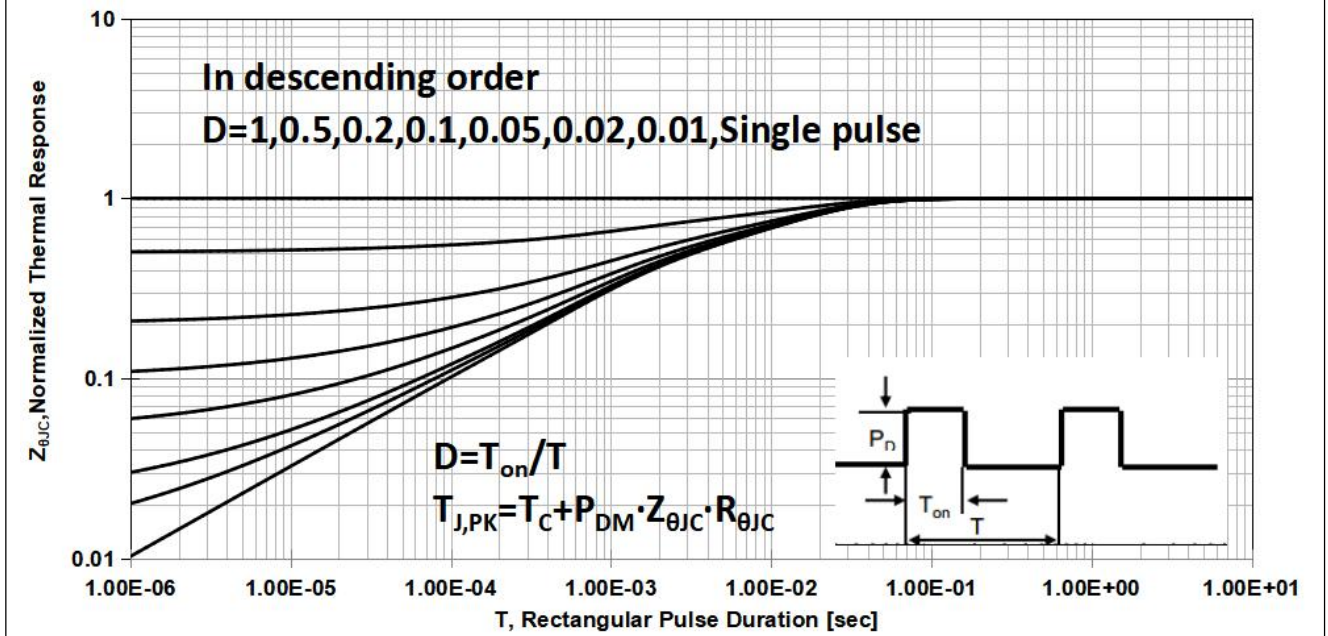


Figure 11 Transient Thermal Impedance_(PDFN5*6)

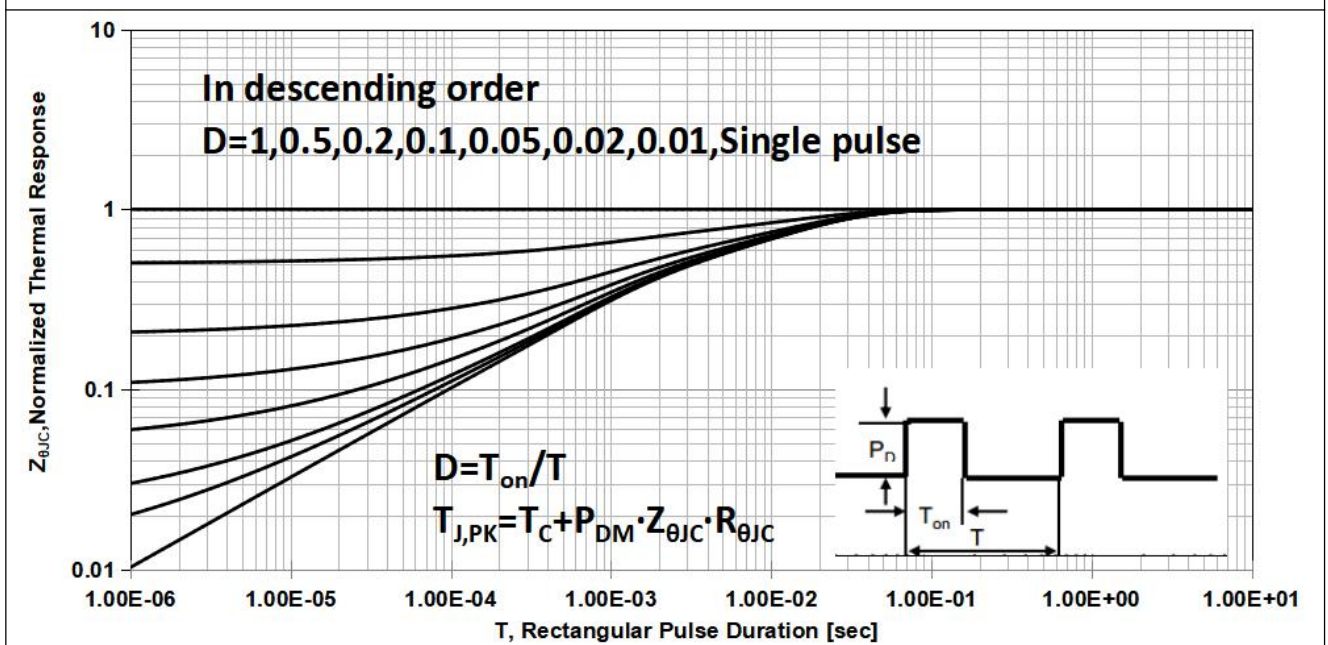
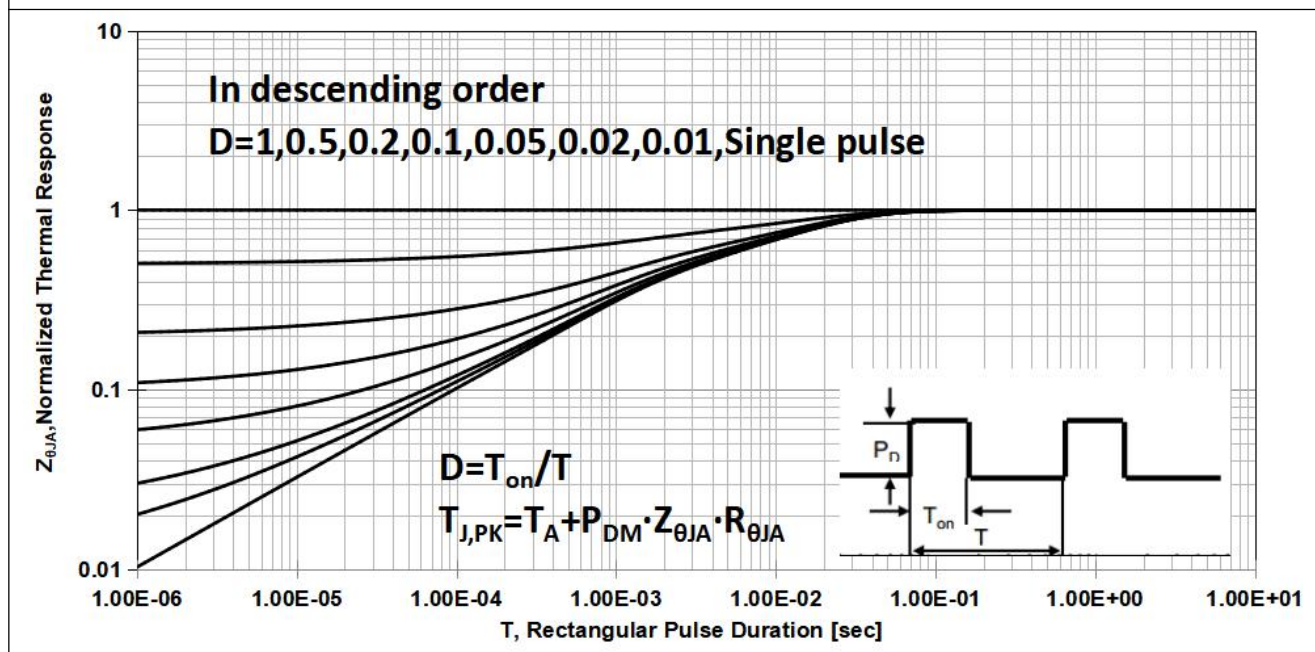
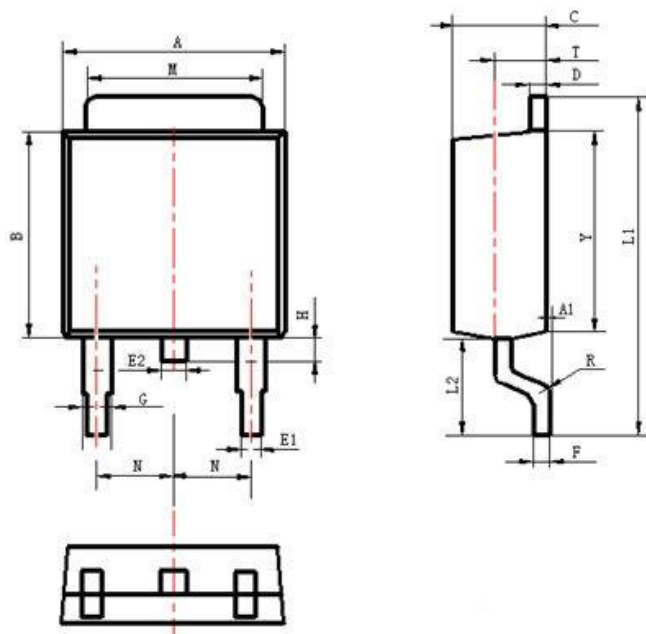


Figure 11 Transient Thermal Impedance(SOP-8)

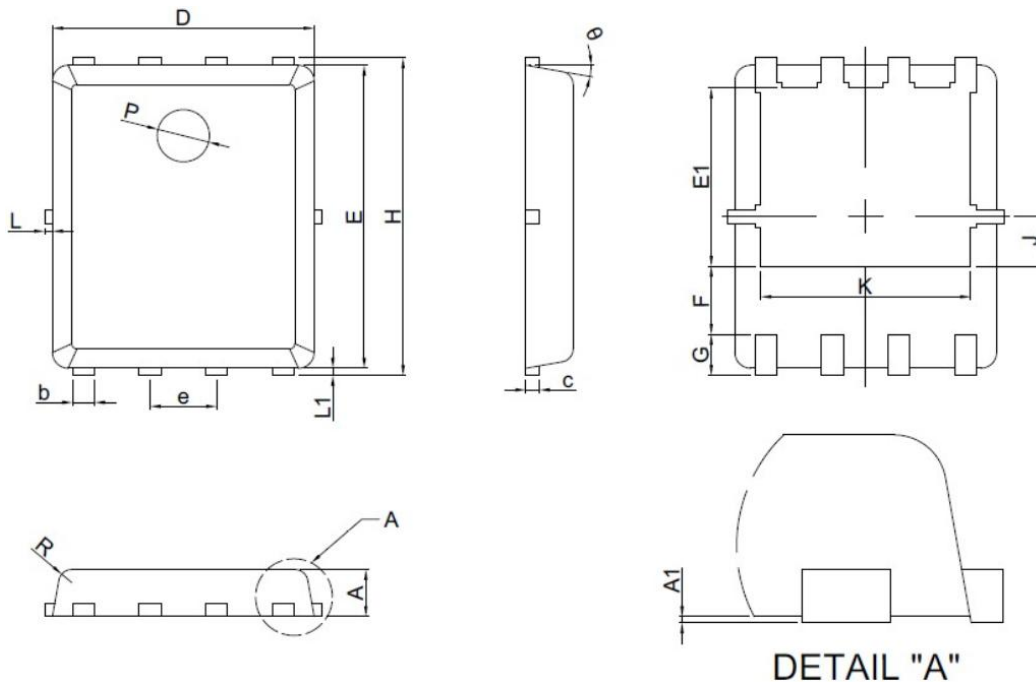


6. Package Description



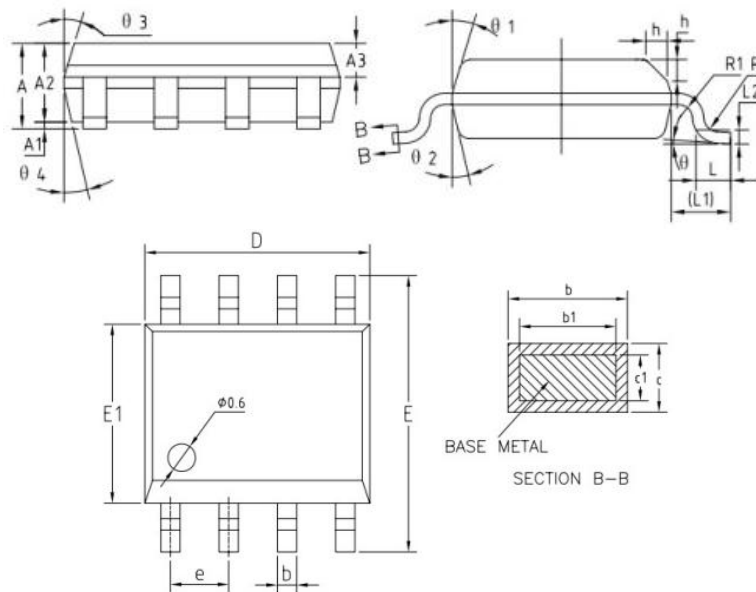
Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
A1	0	0.13
B	5.70	6.30
C	2.10	2.50
D	0.30	0.60
E1	0.60	0.90
E2	0.70	1.00
F	0.30	0.60
G	0.70	1.20
L1	9.60	10.50
L2	2.70	3.10
H	0.60	1.00
M	5.10	5.50
N	2.09	2.49
R	0.3	
T	1.40	1.60
Y	5.10	6.30

TO-252 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



SYMBOL	MIN	NORMAL	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.7
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.18	-	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
θ	0°	-	8°
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°

SOP-8 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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