DESCRIPTION

The AM12NS10H is available in a TO-220, TO-220F, TO-252, TO-251, SOP8, TO-263-2 and PDFN8(5x6) packages.

Package	BVDSS	RDSON	ID
TO-220	100V	10.5 mΩ	55A
TO-220F	100V	10.5 mΩ	34.8A
TO-252	100V	10.5 mΩ	49A
TO-251	100V	10.5 mΩ	49A
SOP8	100V	10.5 mΩ	11A
TO-263-2	100V	10.5 mΩ	55A
PDFN8(5x6)	100V	10.5 mΩ	49A

FEATURES

- Fast Switching
- Low On-Resistance ($R_{DS(ON)}$ ≤12mΩ)
- Low Gate Charge
- Low Reverse transfer capacitances
- High avalanche ruggedness

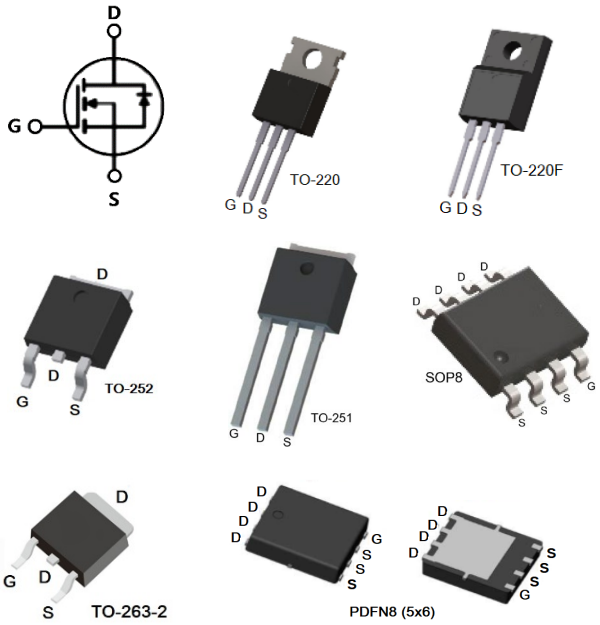
APPLICATION

- Synchronous rectifiers
- High speed switching applications

ORDERING INFORMATION

Package Type	Part Number	
TO-220 SPQ: 50pcs/ Tube	T3	AM12NS10HT3U
		AM12NS10HT3VU
TO-220F SPQ: 50pcs/ Tube	T3F	AM12NS10HT3FU
		AM12NS10HT3FVU
TO-252 SPQ: 2,500pcs/Reel	D	AM12NS10HDR
		AM12NS10HDVR
TO-251 SPQ: 75pcs/ Tube	TD3	AM12NS10HTD3U
		AM12NS10HTD3VU
SOP8 SPQ: 2,500pcs/Reel	M8	AM12NS10HM8R
		AM12NS10HM8VR
TO-263-2 SPQ: 800pcs/Reel	S2	AM12NS10HS2R
		AM12NS10HS2VR
PDFN8 (5x6) SPQ: 5,000pcs/Reel	PJ8	AM12NS10HPJ8R
		AM12NS10HPJ8VR
Note	V: Halogen free Package R: Tape & Reel U: Tube	
AiT provides all RoHS products		

PIN DESCRIPTION



Pin#			Symbol	Function
TO-220, TO-220F, TO-251	TO-252, TO-263-2	SOP8, PDFN8(5x6)		
1	1	4	G	Gate
2	2,4	5,6,7,8	D	Drain
3	3	1,2,3	S	Source

ABSOLUTE MAXIMUM RATINGS

At T_c = 25°C, unless otherwise specified

V_{DSS}, Drain-Source Voltage			100V
I_D	Continuous Drain Current, Silicon Limited	TO-220F	34.8A
		TO-252, TO-251 PDFN8(5x6)	49A
		TO-220, TO-263-2	55A
		SOP8	11A
	Continuous Drain Current, Package Limited	TO-220F, TO-220, TO-263-2, TO-252, TO-251, PDFN8(5x6)	60A
		SOP8	20A
	Continuous Drain Current @T_C =100°C, Silicon Limited	TO-220F	22A
		TO-252, TO-251 PDFN8(5x6)	31.5A
		TO-220, TO-263-2	34.8A
		SOP8	6.9A
I_{DM} (1), Pulsed Drain Current		TO-220F	139.2A
		TO-252, TO-251 PDFN8(5x6)	196A
		TO-220 , TO-263-2	220A
		SOP8	44A
V_{GS}, Gate-Source Voltage			±20V
E_{AS} (2), Avalanche Energy		TO-220F, TO-220, TO-263-2, SOP8	100mJ
		TO-252, TO-251 PDFN8(5x6)	56.2mJ
P_D	Power Dissipation	TO-220F	27.7W
		TO-252, TO-251 PDFN8(5x6)	55.9W
		TO-220, TO-263-2	69.4W
		SOP8	2.7W
	Derating Factor above 25°C	TO-220F	0.22W/℃
		TO-252, TO-251 PDFN8(5x6)	0.447 W/℃
		TO-220, TO-263-2	0.56 W/℃
		SOP8	0.022 W/℃
T_{STG}, Storage Temperature Range			-55℃~150℃
T_J, Junction Temperature			150℃
T_L, Maximum Temperature for Soldering			260℃

Stresses above 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 Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

(2) : TO-220F,TO-220,TO-263-2,SOP8 : L=0.5mH, Ias=20A, Start T_J =25℃
TO-252, TO-251, PDFN8(5x6): L=0.5mH, Ias=15A, Start T_J =25℃

THERMAL CHARACTERISTICS

Parameter		Symbol	Max	Units
Thermal resistance, Junction-Ambient	TO-220F	$R_{\theta JA}$	4.5	℃/W
	TO-252, TO-251 PDFN8(5x6)		75	
	TO-220, TO-263-2		62.5	
	SOP8		45	
Thermal resistance, Junction-Case	TO-252, TO-251 PDFN8(5x6)	$R_{\theta JC}$	2.24	℃/W
	TO-220, TO-263-2		1.80	

ELECTRICAL CHARACTERISTICS

At T_C = 25°C, unless otherwise specified

Parameter	Symbol	Conditions		Min	Typ.	Max	Units
OFF Characteristics							
Drain-Source Breakdown Voltage	V_{DSS}	V_{GS}=0V, I_D=250μA,		100	110	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V,		-	-	1	μA
		V_{DS}=80V, V_{GS}=0V, @ T_C=125℃		-	-	100	μA
Gate-Source Forward Leakage	$I_{GSS(F)}$	V_{GS}=+20V		-	-	100	nA
Gate-Source Reverse Leakage	$I_{GSS(R)}$	V_{GS}=-20V		-	-	-100	nA
ON Characteristics							
Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A.	TO-220F, TO-251, TO-252, TO-220, TO-263-2, PDFN8(5x6)	-	10.5	12	mΩ
		V_{GS}=10V, I_D=10A.	SOP8				
Gate Threshold Voltage	$V_{GS\ (th)}$	V_{DS}= V_{GS}, I_D=250μA		2	3	4	V
Pulse width tp≤300μs,δ≤2%							

Parameter	Symbol	Conditions		Min	Typ.	Max	Units
Dynamic Characteristics							
Input Capacitance	C_{iss}	V_{DS}=50V, V_{GS}=0, f=1MHz		-	1680	-	pF
Output Capacitance	C_{oss}			-	271	-	
Reverse Transfer Capacitance	C_{rss}			-	10	-	
Total Gate Charge	Q_g	V_{DD}=50V, I_D=20A, V_{GS}=10V (TO-220F, TO-251, TO-252, TO-220, TO-263-2, PDFN8(5x6))		-	37	-	nC
Gate-Source charge	Q_{gs}			-	10.2	-	
Gate-Drain charge	Q_{gd}	V_{DD}=50V, I_D=10A, V_{GS}=10V (SOP8)		-	11.3	-	
Gate resistance	R_G	V_{GS}=0, V_{DS}=0		-	1.3	-	Ω
Switching Characteristics							
Turn-On Delay Time	$t_{d(ON)}$	V_{DD}=50V, I_D=10A, V_{GS}=10V,R_G = 5Ω Resistive Load		-	14.4	-	ns
Rise Time	t_r			-	13	-	
Turn-Off Delay Time	$t_{d(OFF)}$			-	28.8	-	
Fall Time	t_f			-	15.2	-	
Source-Drain Diode Characteristics							
Continuous Source Current	I_S		TO-220F	-	-	34.8	A
			TO-252, TO-251 PDFN8(5x6)	-	-	49	
			TO-220, TO-263-2	-	-	55	
			SOP8			10	
Maximum Pulsed Current	I_{SM}		TO-220F	-	-	139.2	A
			TO-252, TO-251 PDFN8(5x6)			196	
			TO-220, TO-263-2			220	
			SOP8			40	
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=20A	TO-220F, TO-252 TO-251, TO-220 TO-263-2 PDFN8(5x6)	-	-	1.2	V
		V_{GS}=0V, I_S=10A	SOP8	-	-	1.2	
Reverse Recovery Time	T_{rr}	I_S=10A, V_{GS}=0, di/dt=250A/us		-	168	-	ns
Reverse Recovery Charge	Q_{rr}			-	335.8	-	nC

TYPICAL PERFORMANCE CHARACTERISTICS

Fig.1 Safe Operating Area (TO-220F)

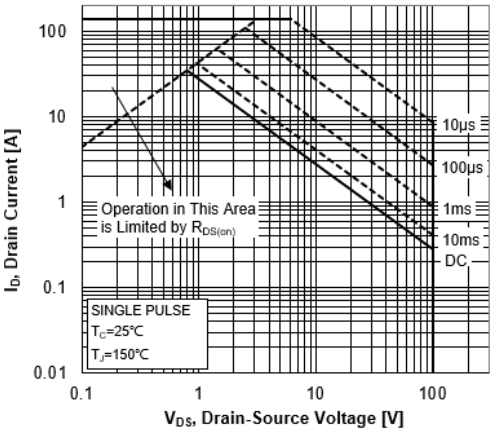


Fig.2 Safe Operating Area (TO-252, TO-251, TO-220, TO-263-2, PDFN8(5x6))

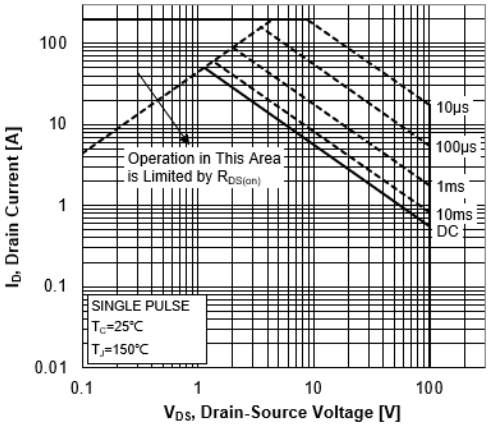


Fig.3 Safe Operating Area (SOP8)

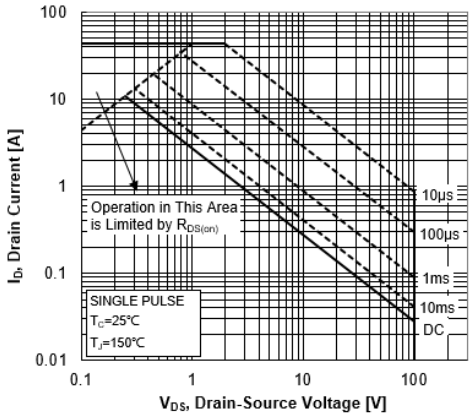


Fig.4 Maximum Power Dissipation vs. Case Temperature (TO-220F)

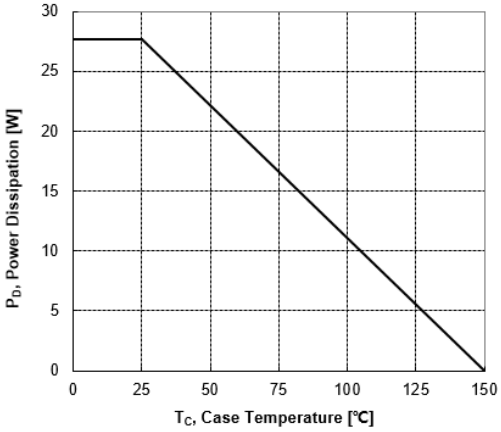


Fig.5 Maximum Power Dissipation vs. Case Temperature (TO-252, TO-251, PDFN8(5x6))

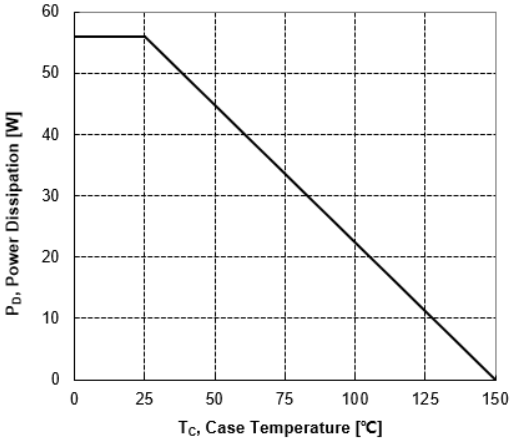


Fig.6 Maximum Power Dissipation vs. Case Temperature (SOP8)

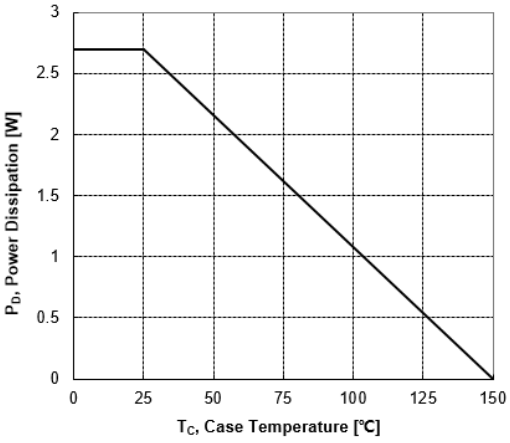


Fig.7 Maximum Power Dissipation vs. Case Temperature (TO-220, TO-263-2)

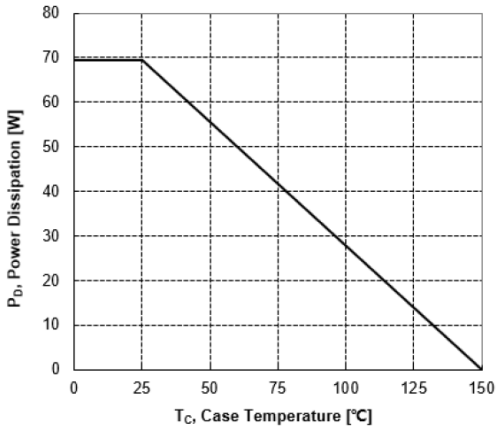


Fig.8 Maximum Continuous Drain Current vs. Case Temperature (TO-220F)

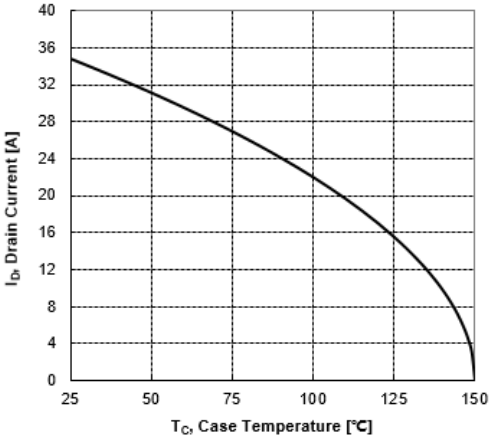


Fig.9 Maximum Continuous Drain Current vs. Case Temperature (TO-252, TO-251, PDFN8(5x6))

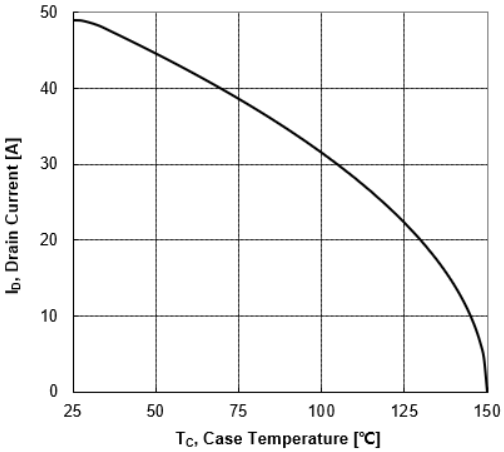


Fig.10 Maximum Continuous Drain Current vs. Case Temperature (SOP8)

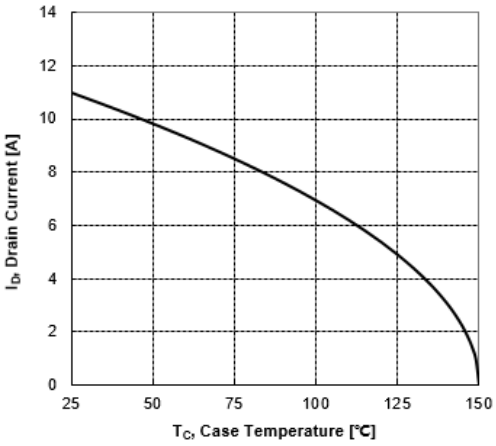


Fig.11 Maximum Continuous Drain Current vs. Case Temperature (TO-220, TO-263-2)

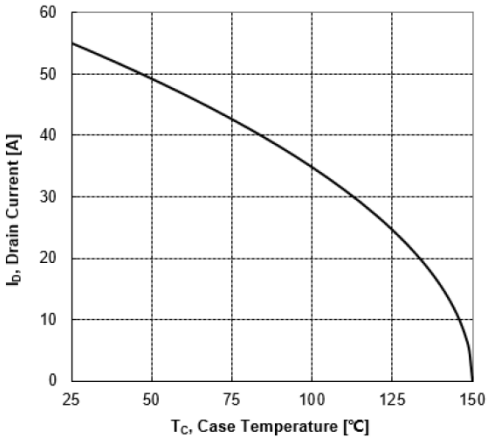


Fig.12 Typical Output Characteristics (TO-220F, TO-251, TO-252, TO-220, TO-263-2, PDFN8(5x6))

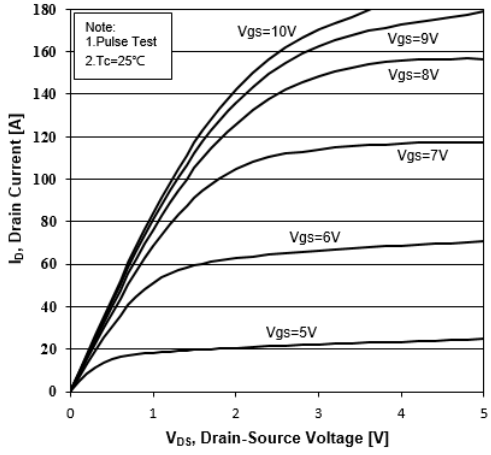


Fig.13 Typical Output Characteristics (SOP8)

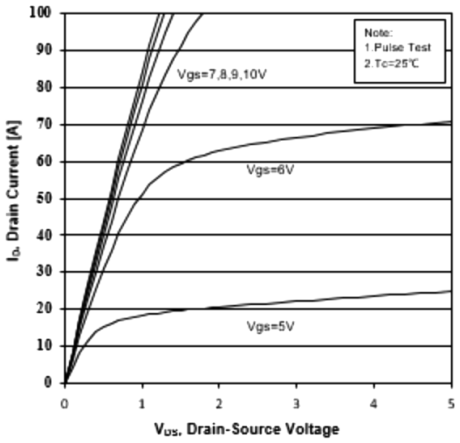


Fig.14 Transient Thermal Impedance (TO-220F)

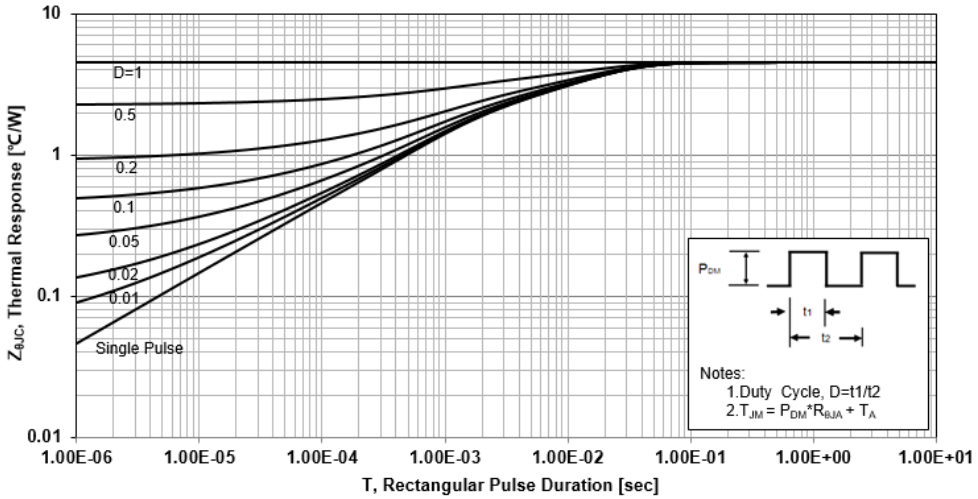


Fig.15 Transient Thermal Impedance (TO-252, TO-251, TO-220, TO-263-2, PDFN8(5x6))

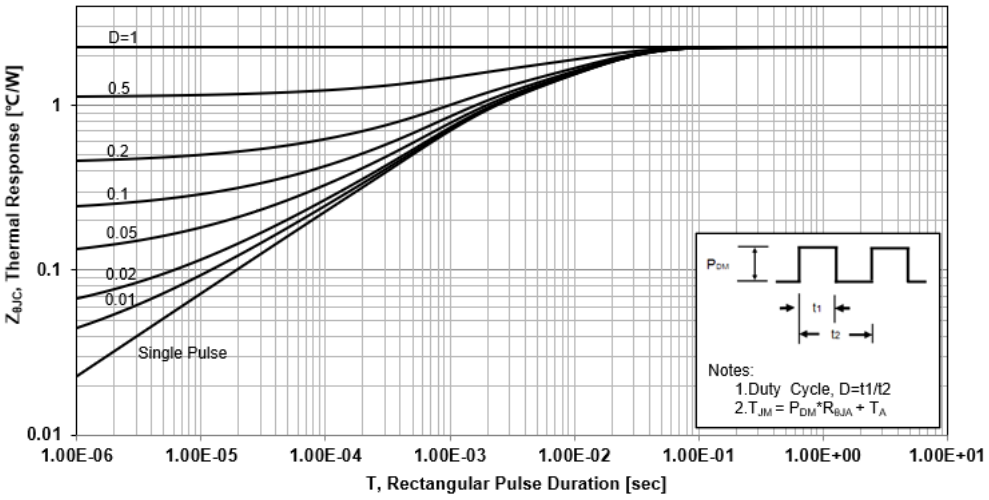


Fig.16 Transient Thermal Impedance (SOP8)

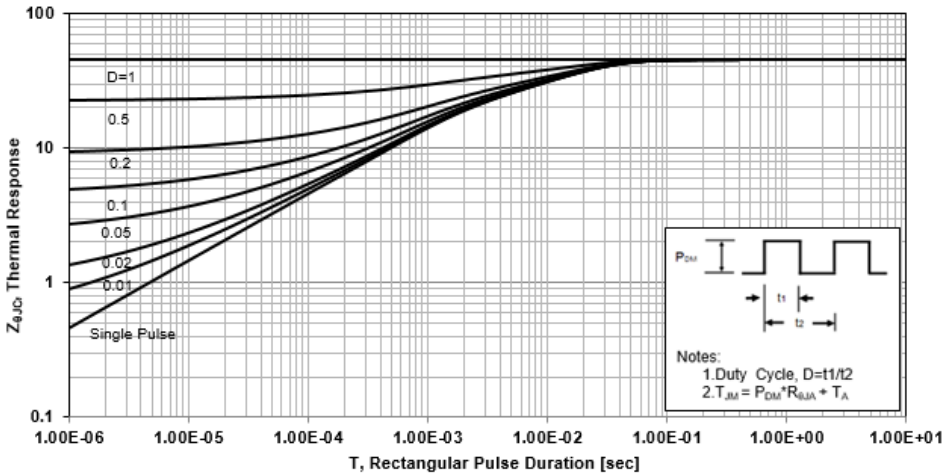


Fig.17 Typical Transfer Characteristics

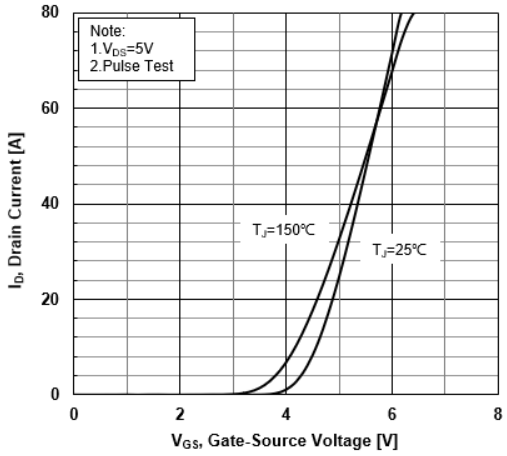


Fig.18 Source-Drain Diode Forward Characteristics

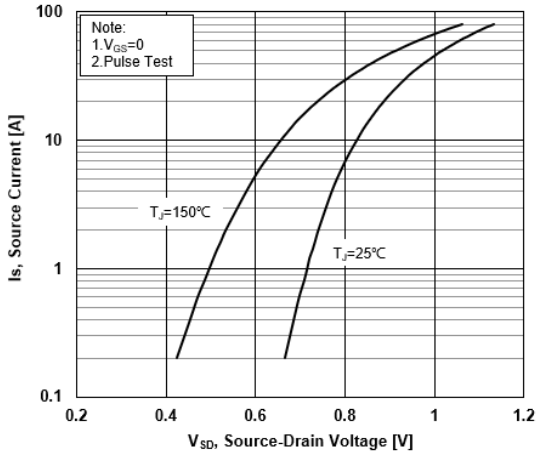


Fig.19 Drain-Source On-Resistance vs. Drain Current (TO-220F, TO-220, TO-263-2)

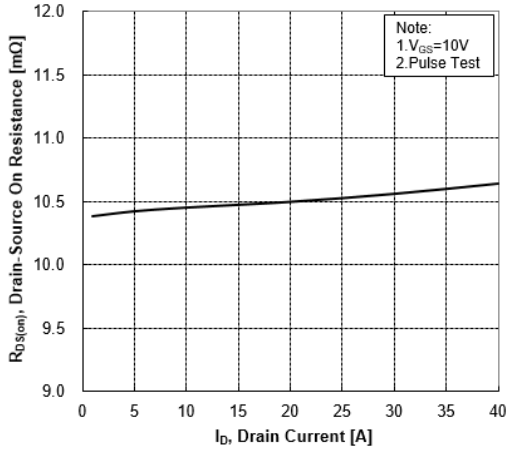


Fig.20 Drain-Source On-Resistance vs. Drain Current (TO-252, TO-251, PDFN8(5x6))

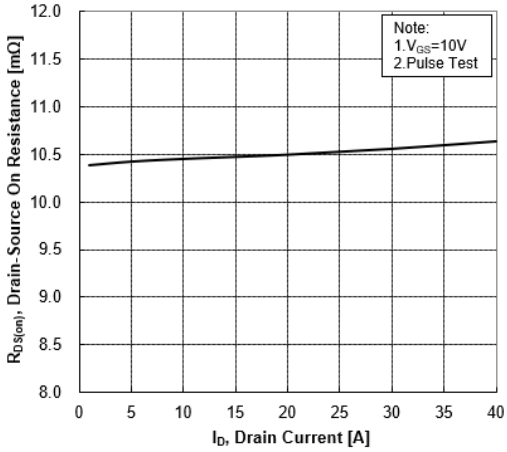


Fig.21 Drain-Source On-Resistance vs. Drain Current (SOP8)

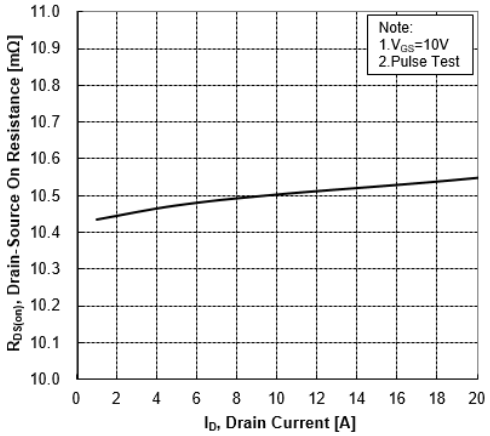


Fig.22 Normalized On-Resistance vs. Junction Temperature (TO-220F, TO-251, TO-252, TO-220, TO-263-2, PDFN8(5x6))

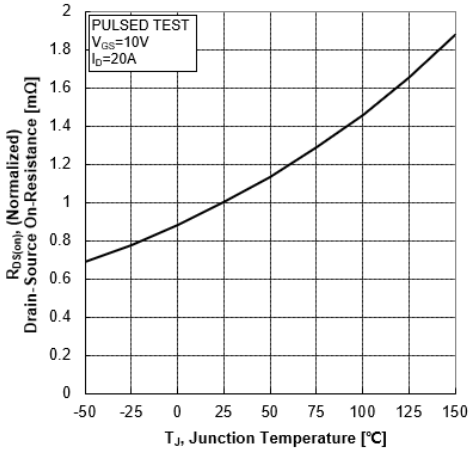


Fig.23 Normalized On-Resistance vs. Junction Temperature (SOP8)

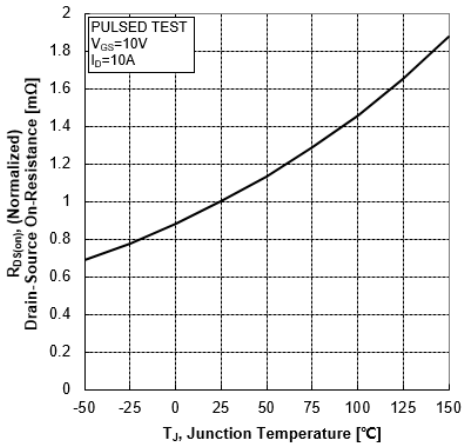


Fig.24 Normalized Threshold Voltage vs. Junction Temperature

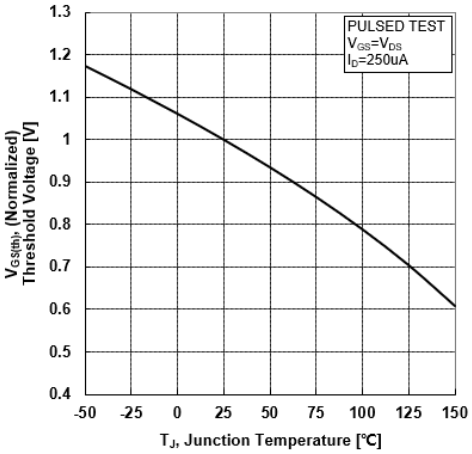


Fig.25 Normalized Breakdown Voltage vs. Junction Temperature

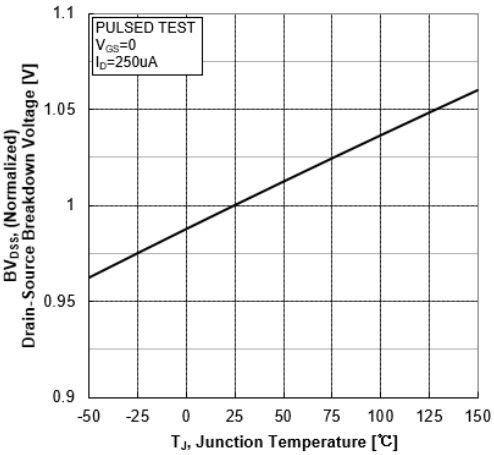


Fig.26 Capacitance Characteristics

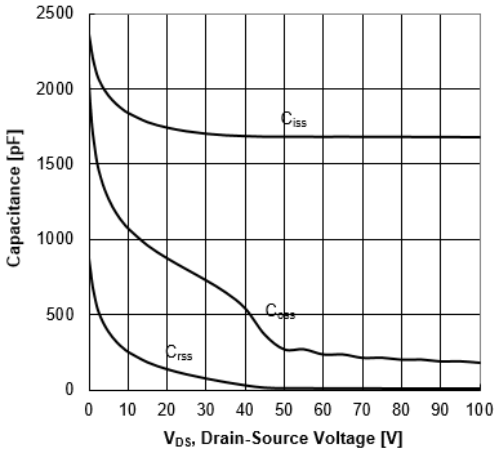


Fig.27 Typical Gate Charge vs. Gate-Source Voltage (TO-220F, TO-252, TO-251 TO-220, TO-263-2, PDFN8(5x6))

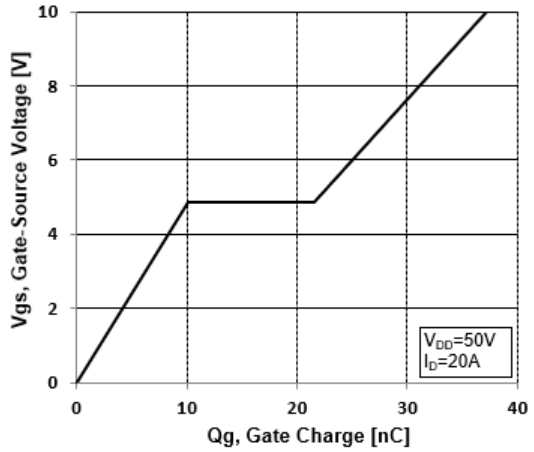


Fig.28 Typical Gate Charge vs. Gate-Source Voltage (SOP8)

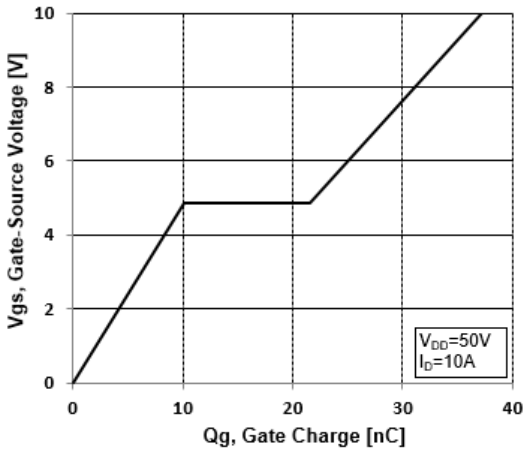


Fig.29 Resistive Switching Test Circuit

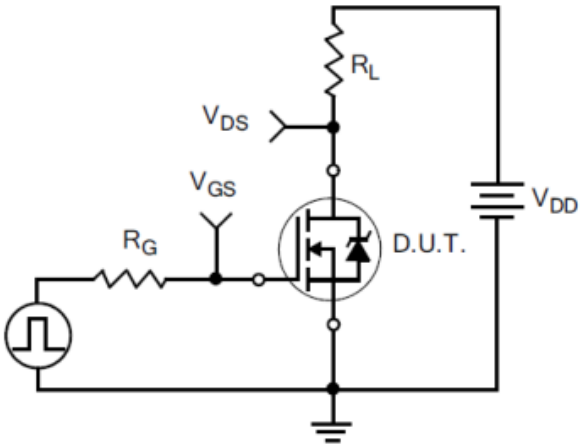


Fig.30 Resistive Switching Waveforms

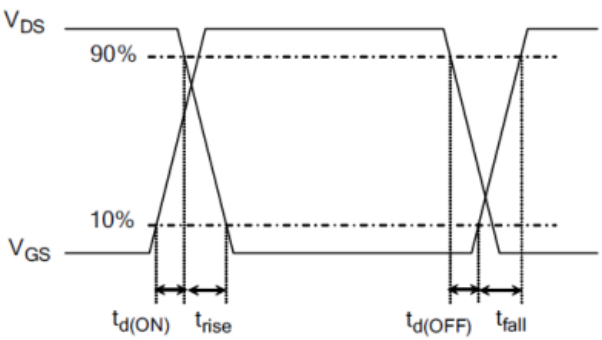


Fig.31 Gate Charge Test Circuit

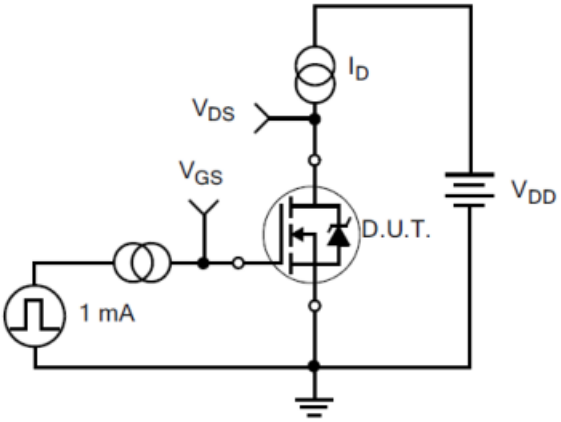


Fig.32 Gate Charge Waveforms

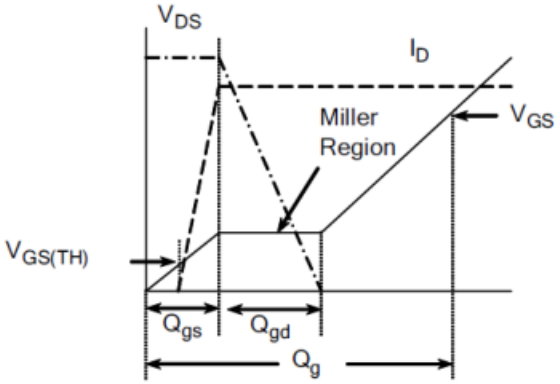


Fig.33 Diode Reverse Recovery Test Circuit

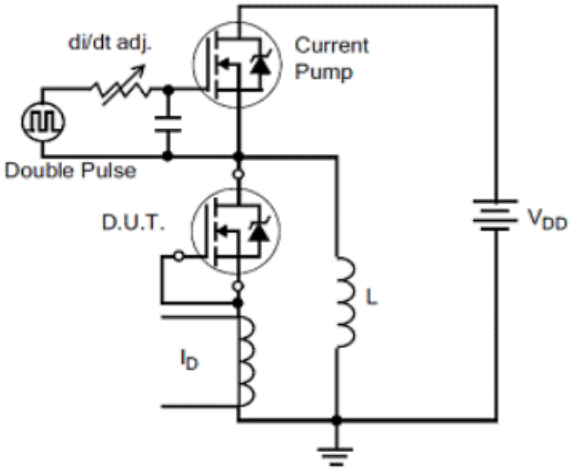


Fig.34 Diode Reverse Recovery Waveform

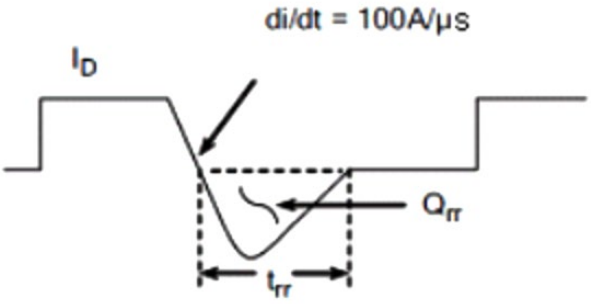


Fig.35 Unclamped Inductive Switching Test Circuit

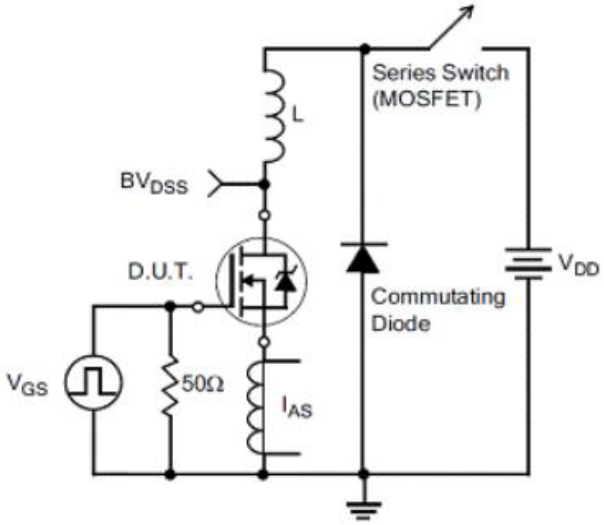
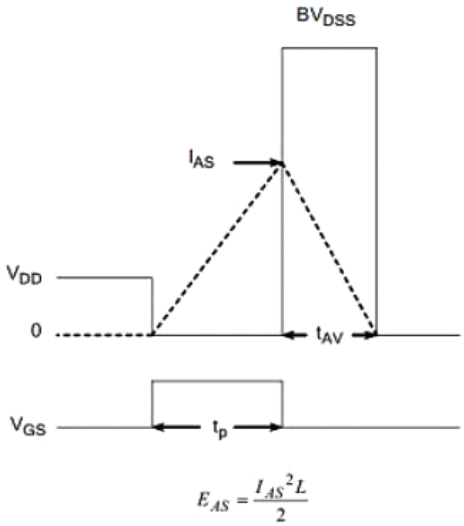


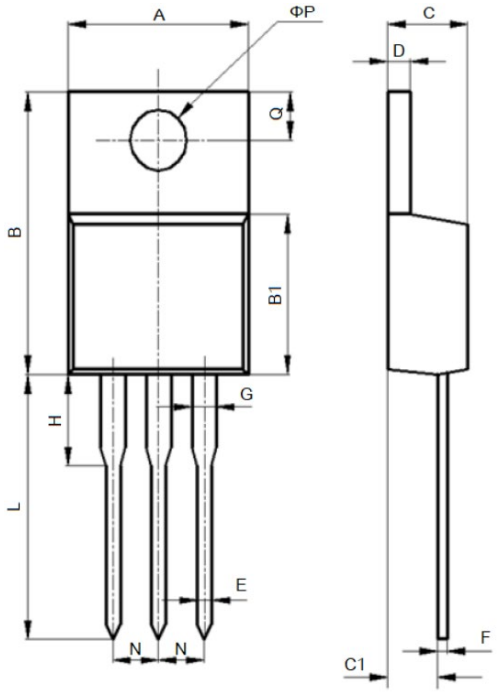
Fig.36 Unclamped Inductive Switching Waveform



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

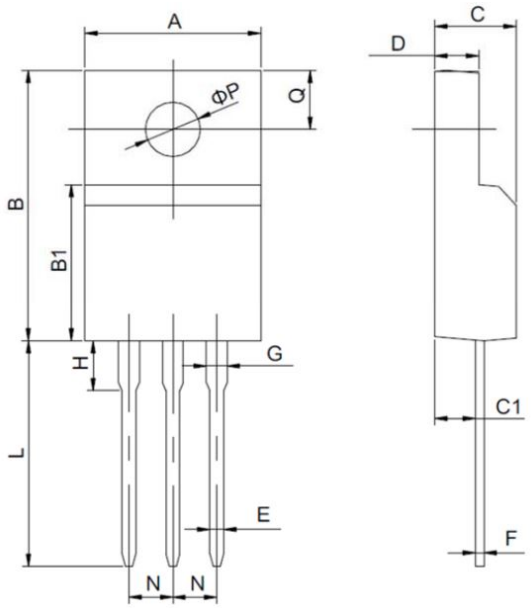
PACKAGE INFORMATION

Dimension in TO-220 (Unit: mm)



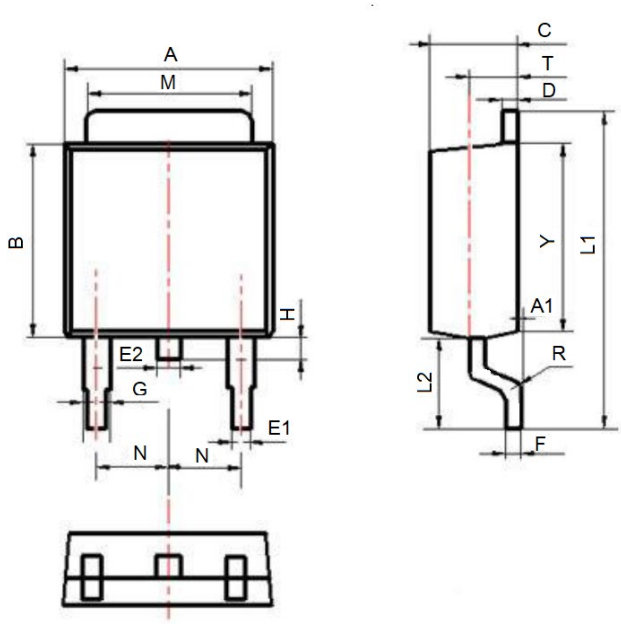
Symbol	Min.	Max.
A	9.600	10.600
B	15.000	16.000
B1	8.900	9.500
C	4.300	4.800
C1	2.300	3.100
D	1.200	1.400
E	0.700	0.900
F	0.300	0.600
G	1.170	1.370
H	2.700	3.800
L	12.600	14.800
N	2.340	2.740
Q	2.400	3.000
ΦP	3.500	3.900

Dimension in TO-220F (Unit: mm)



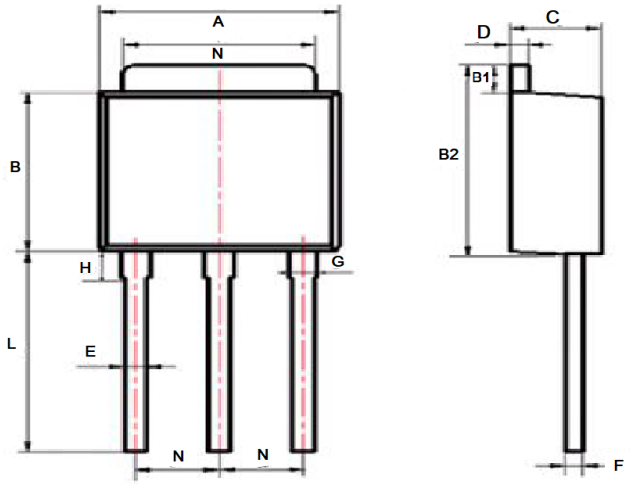
Symbol	Min.	Max.
A	9.600	10.400
B	15.400	16.200
B1	8.900	9.500
C	4.300	4.900
C1	2.100	3.000
D	2.400	3.000
E	0.600	1.000
F	0.300	0.600
G	1.120	1.420
H	1.600	3.800
L	12.000	14.000
N	2.340	2.740
Q	3.150	3.550
ΦP	2.900	3.300

Dimension in TO-252 (Unit: mm)



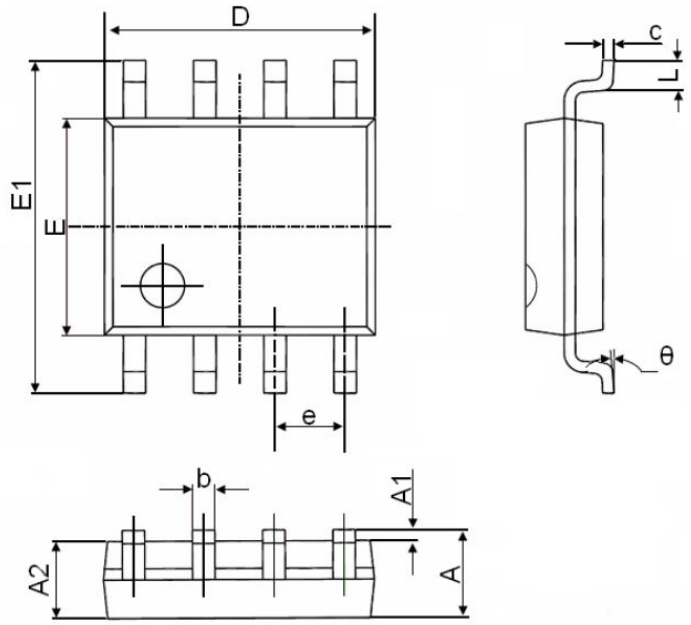
Symbol	MILLIMETERS	
	Min.	Max.
A	6.300	6.900
A1	0	0.130
B	5.700	6.300
C	2.100	2.500
D	0.300	0.600
E1	0.600	0.900
E2	0.700	1.000
F	0.300	0.600
G	0.700	1.200
L1	9.600	10.500
L2	2.700	3.100
H	0.600	1.000
M	5.100	5.500
N	2.090	2.490
R	0.300	0.300
T	1.400	1.600
Y	5.100	6.300

Dimension in TO-251 Package (Unit: mm)



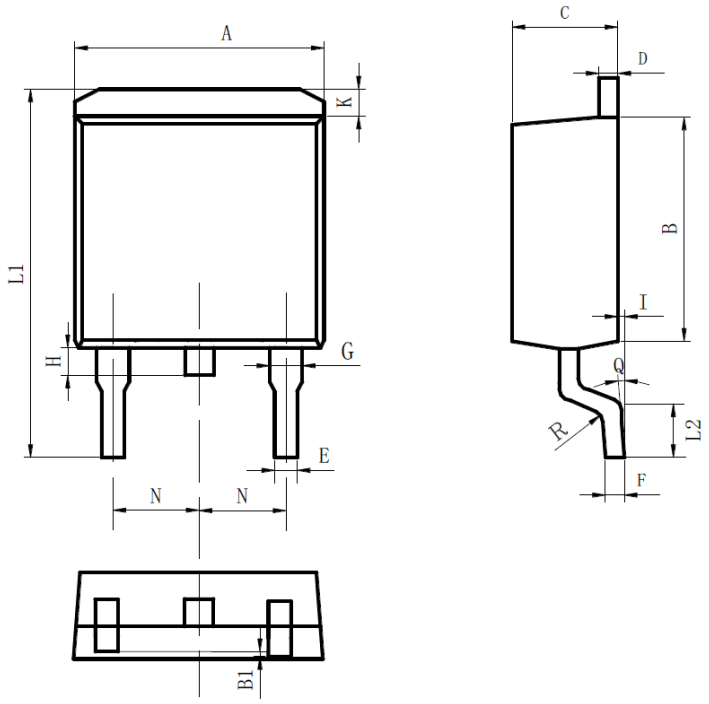
Symbol	Min.	Max.
A	6.300	6.900
B	5.700	6.300
B1	1.000	1.200
B2	6.800	7.400
C	2.100	2.500
D	0.300	0.600
E	0.500	0.700
F	0.300	0.600
G	0.700	1.000
H	1.600	2.400
L	3.900	4.300
M	5.100	5.500
N	2.090	2.490

Dimension in SOP8 Package (Unit: mm)



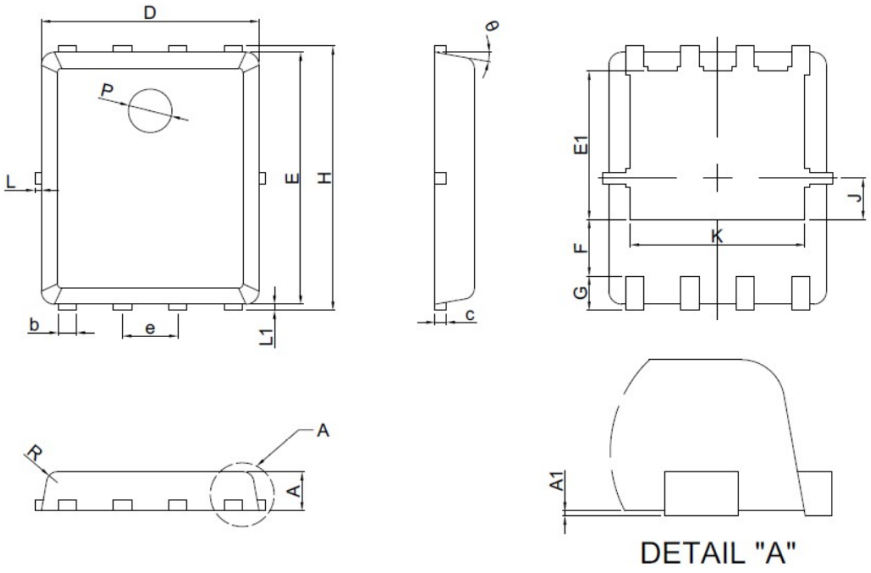
Symbol	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270(BSC)	
L	0.400	1.270
θ	0°	8°

Dimension in TO-263-2 (Unit: mm)



Symbol	MILLIMETERS	
	Min.	Max.
A	9.800	10.400
B	8.900	9.500
B1	0.000	0.100
C	4.400	4.800
D	1.160	1.370
E	0.700	0.950
F	0.300	0.600
G	1.070	1.470
H	1.300	1.800
K	0.950	1.370
L1	14.500	16.500
L2	1.600	2.300
I	0.000	0.200
Q	0°	8°
R	0.4°	
N	2.390	2.690

Dimension in PDFN8(5x6) (Unit: mm)



Symbol	MILLIMETERS	
	Min.	Max.
A	0.800	1.000
A1	0.000	0.050
b	0.350	0.490
c	0.254 REF	
D	4.900	5.100
E	5.700	5.900
E1	3.350	3.650
e	1.270 BSC	
F	1.400 REF	
G	0.600 REF	
H	5.950	6.200
J	0.950 BSC	
K	4.000 REF	
L	-	0.150
L1	0.100	0.180
P	1.000 REF	
R	0.250 REF	
θ	6°	14°

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