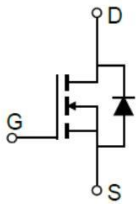
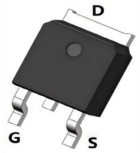
N-Channel Super Junction MOSFET

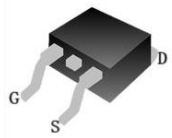
Parameter	Value	Unit
V_{DS}	650	V
$R_{DS(on)}$	150	mΩ
I_D	20	A



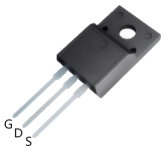
TO-252



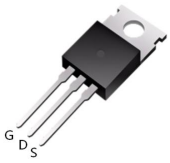
TO-263



TO-220F



TO-220



Features

- Super Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM
- Ultra-fast body diode

Applications

- Power Supply
- EV Charger
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System

Package Marking and Ordering Information:

Part No.	Package	Packing
HMJ20N65FX100	TO-252	Reel
HMJ20N65SX100	TO-263	Reel
HMJ20N65TX100	TO-220	Tube
HMJ20N65TFX100	TO-220F	Tube

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continue Drain Current [1]	T_C=25℃	I_D	20	A
Continue Drain Current	T_C=100℃		12	A
Pulsed Drain Current [2]	T_C=25℃	I_{DM}	57	A
Power Dissipation	T_C=25℃	P_D	252/263/220：150 220F：24	W
Single Pulse Avalanche Energy (L=30mH)		E_{AS}	210	mJ
MOSFET dv/dt ruggedness		dv/dt	50	V/ns
Operating Temperature Range		T_J	-55 to +150	℃
Storage Temperature Range		T_{STG}	-55 to +150	℃

NOTES:

1) Limited by Tj, max . Maximum Duty Cycle D = 0.50

2) Pulse width tp limited by Tj,max

Thermal Characteristics

Parameter	Symbol	263/220/252	220F	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.83	4	℃/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62	80	℃/W

Electrical Characteristics(T_J=25℃,unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=250μA	650	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V,T_C=25℃	--	--	1.0	μA
		V_{DS}=650V, V_{GS}=0V,T_C=150℃	--	1.0	--	μA
Gate Leakage Current	I_{GSS}	V_{GS}= ±30V, V_{DS}=0V	--	--	±10	μA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	3	--	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=10A,T_C=25℃	--	150	190	mΩ
		V_{GS}=10V, I_D=10A,T_C=150℃	--	408	--	mΩ
Transconductance	g_{fs}	V_{DS}=20V, I_D=10A	--	13	--	S
Gate resistance	$R_{g.int}$	f=1.0MHz	--	13	--	Ω
Input Capacitance	C_{iss}	V_{DS}=100V, V_{GS}=0V f=1.0MHz	--	1100	--	pF
Output Capacitance	C_{oss}		--	67	--	pF
Reverse Transfer Capacitance	C_{rss}		--	0.8	--	pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=400V, I_D=10A V_{GS}=10V, R_G=27Ω	--	46	--	ns
Rise Time	t_r		--	61	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	120	--	ns
Fall Time	t_f		--	34	--	ns
Total Gate Charge	Q_g	V_{DS}= 480V, V_{GS}=10V I_D=10A	--	36	--	nC
Gate to Source Charge	Q_{gs}		--	10	--	nC
Gate to Drain Charge	Q_{gd}		--	20	--	nC

Diode Characteristics

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Continuous Diode Forward Current	I_S	T_C=25℃	--	--	20	A
Diode Pulsed Current	I_{SM}	T_C=25℃	--	--	80	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V , I_S=10A , T_J=25℃	--	0.85	1.1	V
Reverse recovery time	t_{rr}	V_{DD}=400V,I_F=10A di/ dt=100A/μs	--	95	--	ns
Reverse recovery charge	Q_{rr}		--	0.32	--	uC

Typical Characteristics

Fig 1.Output Characteristics(T_J=25℃)

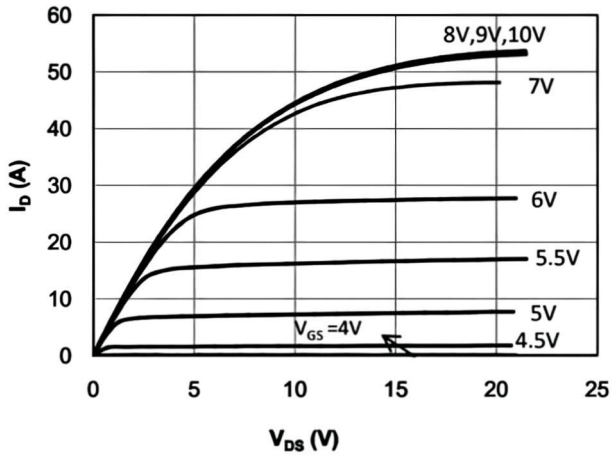


Fig 2.Output Characteristics(T_J=150℃)

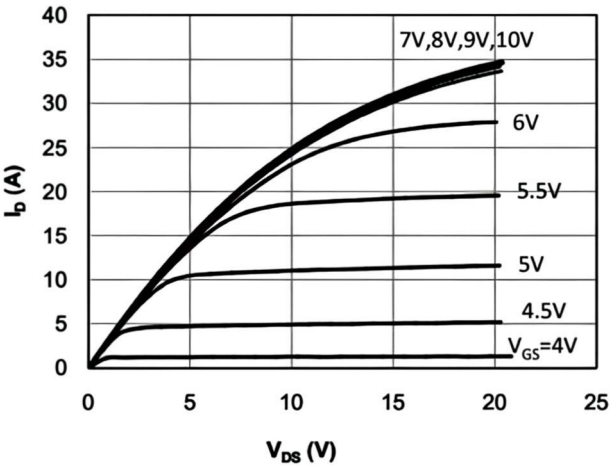


Fig 3:Transfer Characteristics

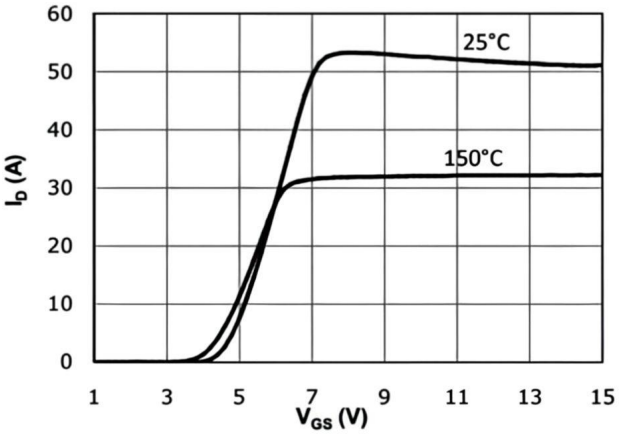


Fig 4:V_{TH} vs.T_J,Temperature Characteristics

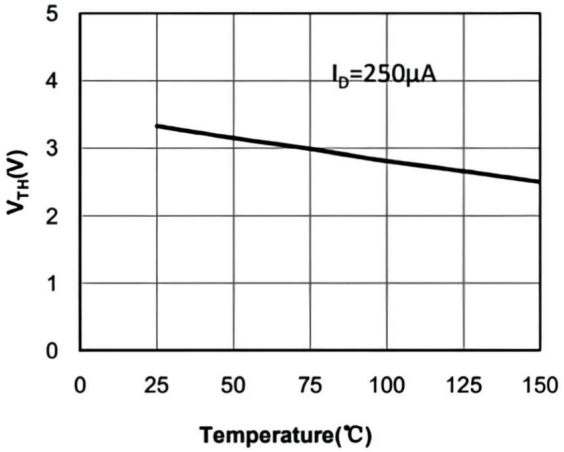


Fig 5:$R_{DS(on)}$vs.I_{DS} Characteristics(T_J=25℃)

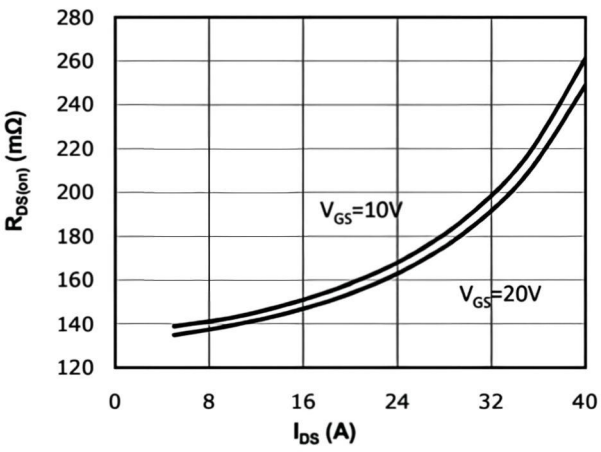


Fig 6:$R_{DS(on)}$ vs.Temperature

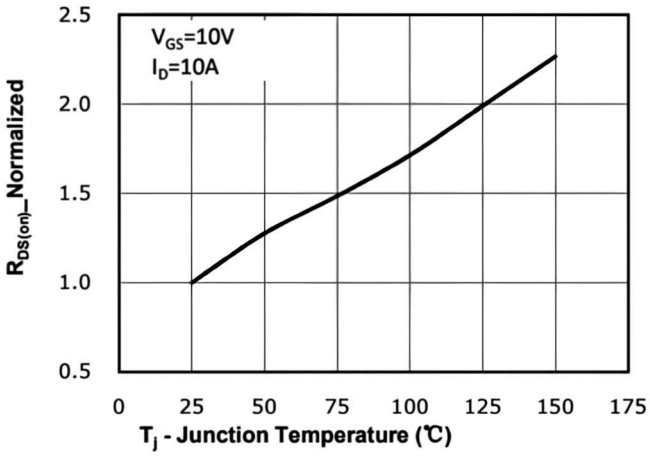


Fig 7:BV_{DSS} vs.Temperature

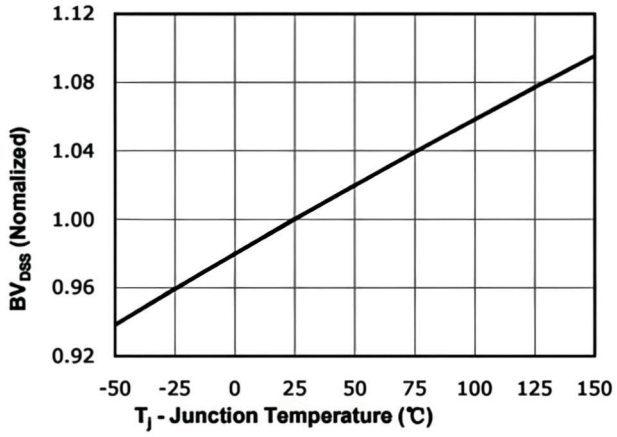


Fig 8:$R_{DS(on)}$ vs.Gate Voltage

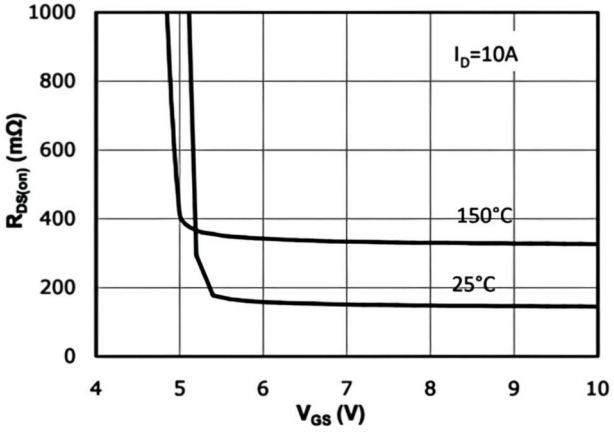


Fig 9:Body-diode Forward Characteristics

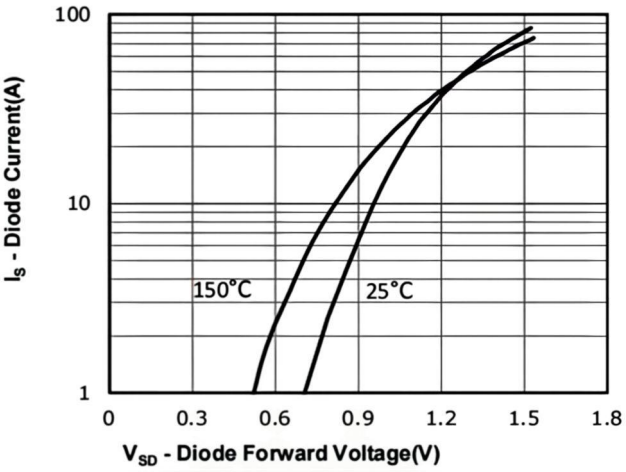


Fig 10:Gate Charge Characteristics

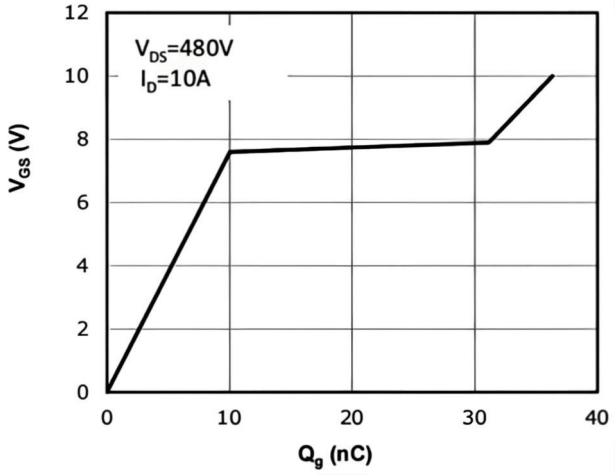


Fig 11:Capacitance Characteristics

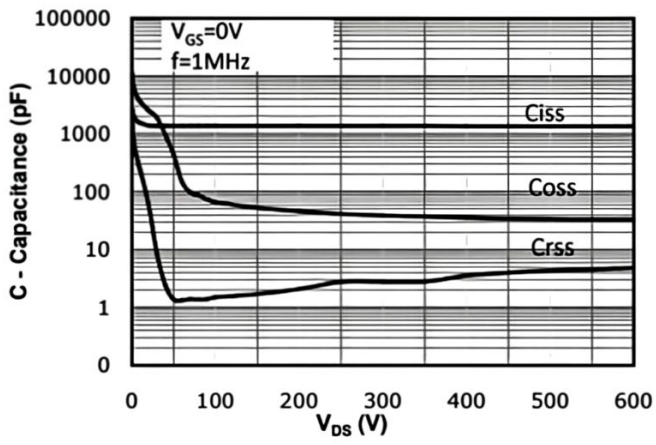


Fig 12:Safe Operating Area

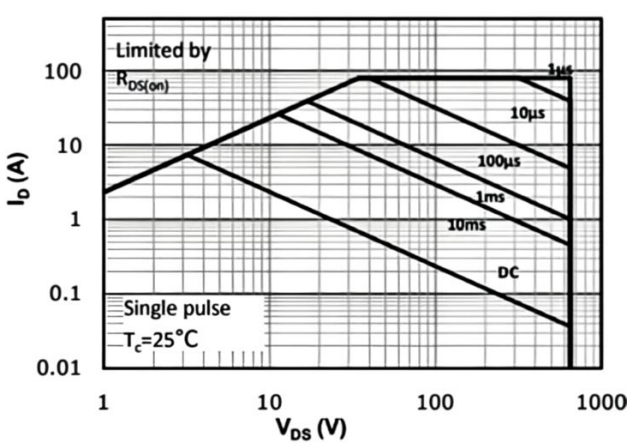


Fig13:Safe operating area T_C=25℃
Non Full PAK

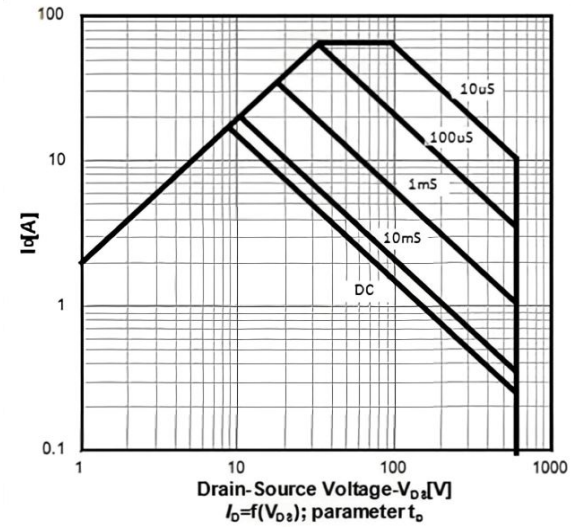


Fig14:Max.transient thermal impedance
TO-220FullPAK

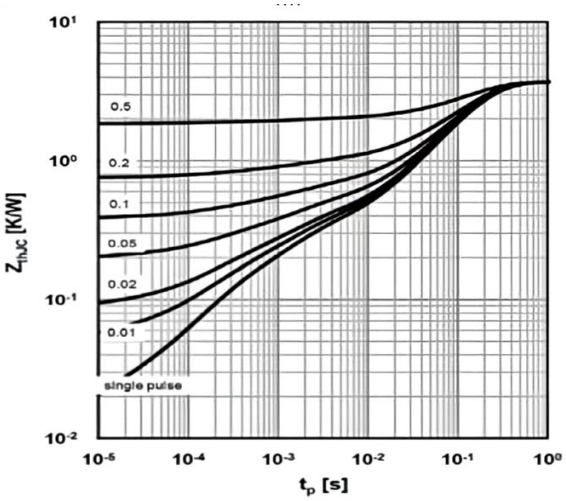
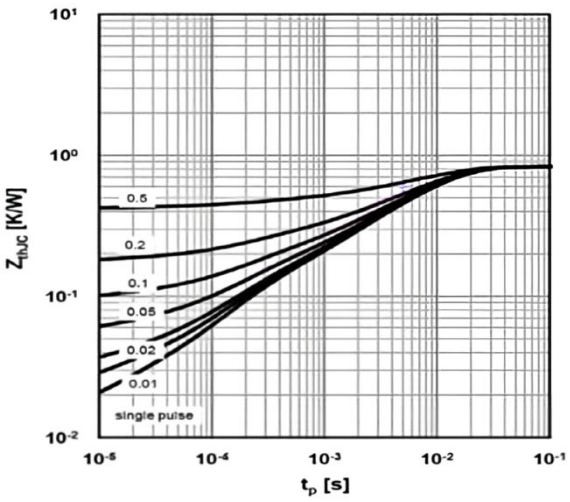
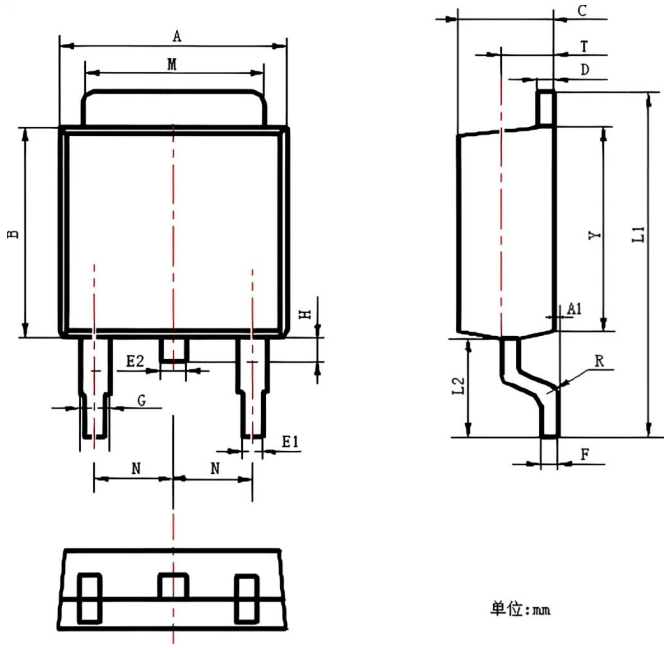


Fig15:Max.transient thermal impedance
TO-220NonFullPAK



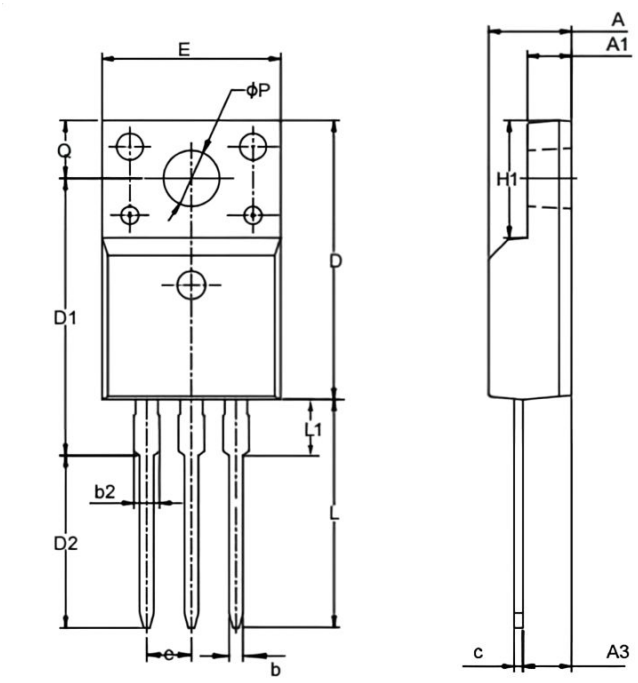
Package Outlines Dimensions (Units: mm)

TO-252



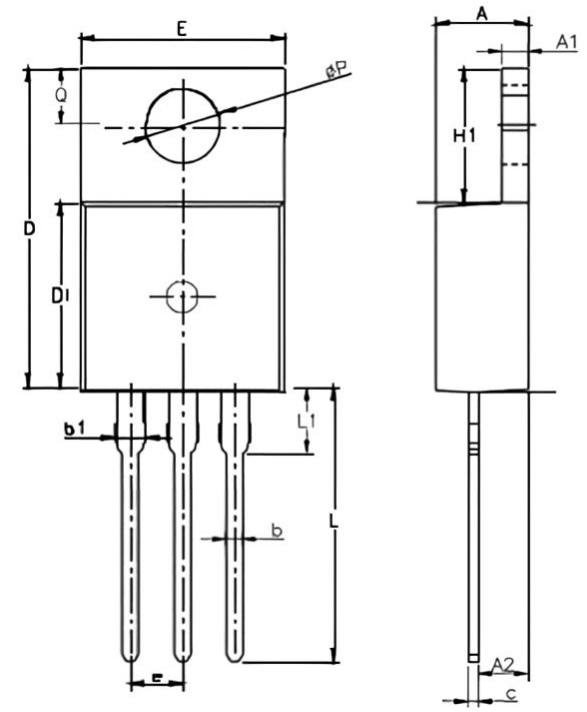
Items	Values(mm)		
	MIN	NOM	MAX
A	6.3	6.5	6.9
A1	0	-	0.16
B	5.7	-	6.3
C	2.1	2.3	2.5
D	0.3	0.5	0.7
E1	0.6	0.65	0.9
E2	0.7	0.65	1
F	0.3	0.5	0.6
G	0.7	0.9	1.2
L1	9.6	10	10.5
L2	2.7	-	3.1
H	0.4	-	1
M	5.1	5.2	5.5
N	2.09	2.2	2.49
R	0.3		
T	1.4	-	1.6
Y	5.1	5.9	6.3

TO-220F



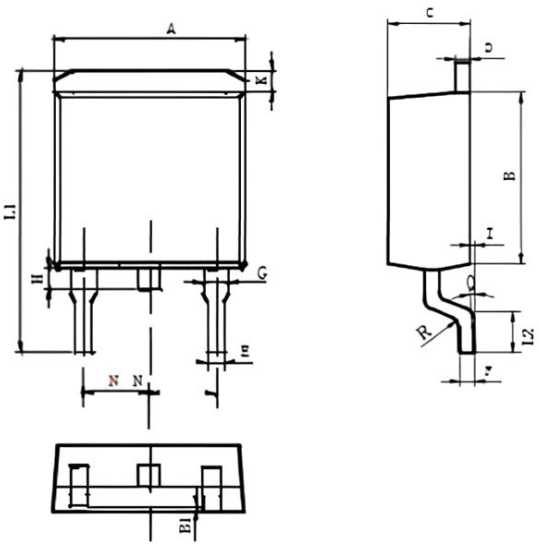
Items	Values(mm)		
	MIN	NOM	MAX
A	4.42	4.7	5.02
A1	2.3	2.54	2.8
A3	2.5	2.76	3.1
b	0.7	0.8	0.9
b2	--	--	1.47
c	0.35	0.5	0.65
D	15.25	15.87	16.25
D1	15.3	15.75	16.3
D2	9.3	9.8	10.3
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.4	6.68	7
L	12.48	12.98	13.48
L1	--	--	3.5
øP	3	3.18	3.4
Q	3.05	3.3	3.55

TO-220



Items	Values(mm)		
	MIN	NOM	MAX
A	4.3	4.5	4.7
A1	1	1.3	1.5
A2	1.8	2.4	2.8
b	0.6	0.8	1
b1	1	-	1.6
c	0.3	-	0.7
D	15.1	15.7	16.1
D1	8.1	9.2	10
F	9.6	9.9	10.4
e	2.54BSC		
H1	6.1	6.5	7
L	12.6	13.08	13.6
L1			3.95
ΦP	3.4	3.7	3.9
Q	2.6		3.2

TO-263



Items	Values(mm)		
	MIN	NOM	MAX
A	9.8	10	10.4
B	8.9	9.6	9.5
B1	0	-	0.1
C	4.4	4.5	4.8
D	1.16	1.4	1.5
E	0.7	0.75	0.95
F	0.3	0.45	0.6
G	1.07	1.38	1.47
H	1.3	-	1.8
K	0.95	1	1.37
L1	14.5	15.2	16.5
L2	1.6	2	2.3
I	0	-	0.2
Q	0°	3°	8°
R	0.4		
N	2.35	2.4	2.7

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