

CMPG65R180/CMBG65R180/CMIG65R180/CMFG65R180

650V, 180mΩ typ., 20A N-Channel Silicon Carbide Power MOSFET

General Description

This silicon carbide Power MOSFET device has been developed using Cmos's advanced Sic MOSFET technology. The device features a very low $R_{DS(on)}$ over the entire temperature range combined with low capacitances and very high switching operations, which improve application performance in frequency, energy efficiency, system size and weight reduction.

Features

- 100% Avalanche Tested
- Optimized switching with a low gate charge
- Fast intrinsic diode with low reverse recovery
- RoHS Compliant

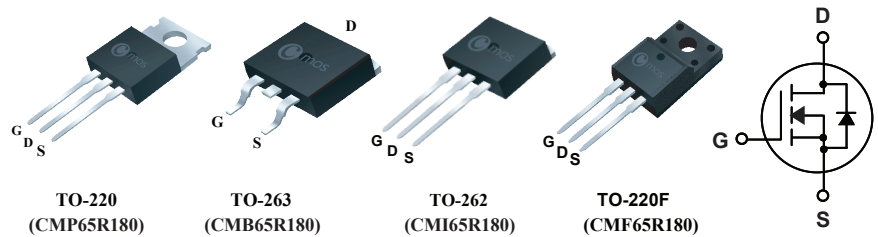
Product Summary

BVDSS	$R_{DS(on)}$ max.	ID
650V	210mΩ	20A

Applications

- Low power system, SMPS
- Adapter, LED power, TV display

TO-220/263/262/220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	220/263/262	220F	Units
V_{DS}	Drain-Source Voltage	650		V
V_{GS}	Absolute maximum values	-10/+22		V
V_{GSop}	Recommended operational values	0/+18		V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current	20	20*	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current	14	14*	A
I_{DM}	Pulsed Drain Current	55	55*	A
EAS	Single Pulse Avalanche Energy (Note 1)	303		mJ
$P_D@T_C=25^{\circ}C$	Total Power Dissipation	100	50	W
T_{STG}	Storage Temperature Range	-55 to 175		$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 175		$^{\circ}C$

* Drain current limited by maximum junction temperature.

Thermal Data

Symbol	Parameter	220/263/262	220F	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient Max.	40	40	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case Max.	1.5	3	$^{\circ}C/W$

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Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=1mA$	650	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=18V$, $I_D=6A$	---	180	210	mΩ
		$V_{GS}=18V$, $I_D=6A$, $T_J=175^{\circ}\text{C}$	---	195	---	
		$V_{GS}=15V$, $I_D=6A$	---	280	---	
		$V_{GS}=15V$, $I_D=6A$, $T_J=175^{\circ}\text{C}$	---	260	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=2.5mA$ (tested after $V_{GS}=22V$, 1ms pulse)	2.5	3.5	5.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=650V$, $V_{GS}=0V$	---	1	50	μA
		$V_{DS}=650V$, $V_{GS}=0V$, $T_J=175^{\circ}\text{C}$	---	20	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=+22V$, $V_{DS}=0V$	---	---	+250	nA
		$V_{GS}=-10V$, $V_{DS}=0V$	---	---	-250	
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$	---	3.6	---	Ω
$Q_{g(tot)}$	Total Gate Charge	$V_{DS}=500V$, $I_D=6A$ $V_{GS}=0V$ to 18V	---	15	---	nC
Q_{gs}	Gate-Source Charge		---	3.2	---	
Q_{gd}	Gate-Drain Charge		---	5	---	
E_{oss}	Stored Energy in Output Capacitance	$V_{GS}=0V$, $V_{DS}=0V$ to 500V	---	5.7	---	μJ
$C_{o(er)}$	Energy Related Output Capacitance		---	46	---	
$C_{o(tr)}$	Time Related Output Capacitance		---	65	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=0V / 18V$, $V_{DS}=500V$	---	8.5	---	ns
T_r	Rise Time	$R_G=10\Omega$, $I_D=6A$	---	14.5	---	
$T_{d(off)}$	Turn-Off Delay Time	FWD = 650V 4A SiC Diode	---	19	---	
T_f	Fall Time	Inductive load	---	9	---	
C_{iss}	Input Capacitance	$V_{DS}=100V$, $V_{GS}=0V$, $f=1MHz$	---	350	---	pF
C_{oss}	Output Capacitance		---	80	---	
C_{rss}	Reverse Transfer Capacitance		---	8	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	20	A
I_{SM}	Pulsed Source Current		---	---	55	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_{SD}=4A$, $T_J=25^{\circ}\text{C}$	---	4.1	---	V
t_{rr}	Reverse Recovery Time	$di/dt=600A/\mu s$, Includes Q_{OSS} $V_{DD}=500V$, $I_{SD}=6A$, $T_J=25^{\circ}\text{C}$	---	10	---	ns
Q_{rr}	Reverse Recovery Charge		---	18	---	nC
I_{rrm}	Peak Reverse Recovery Current		---	3	---	A

Note :

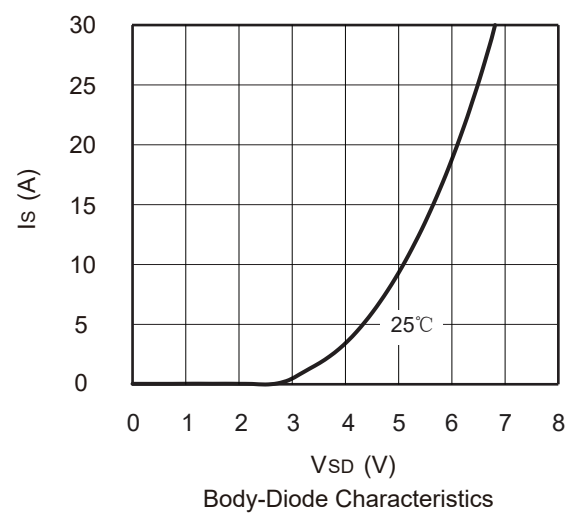
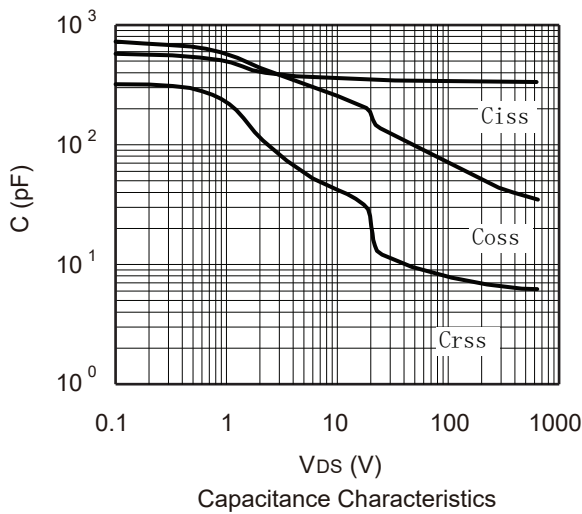
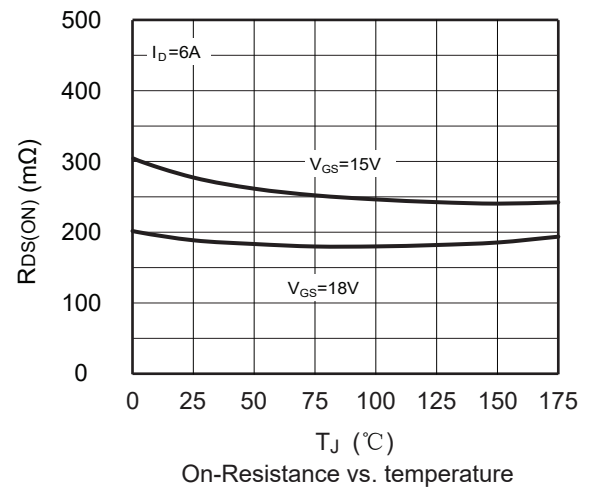
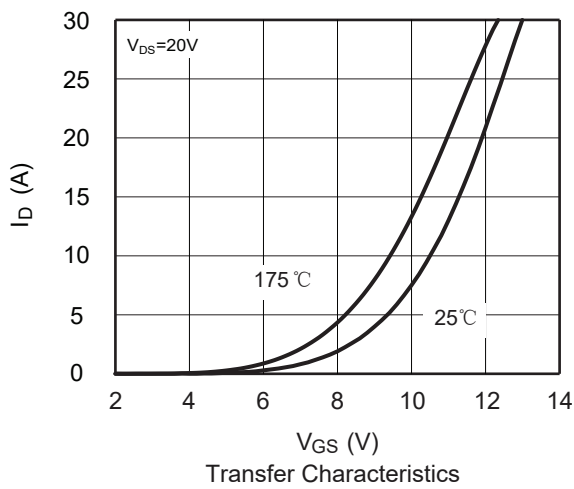
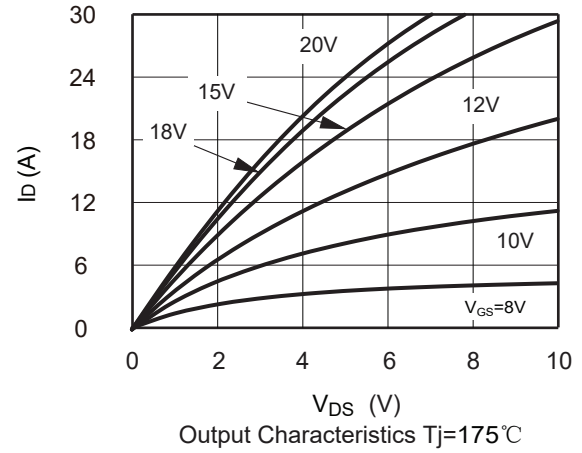
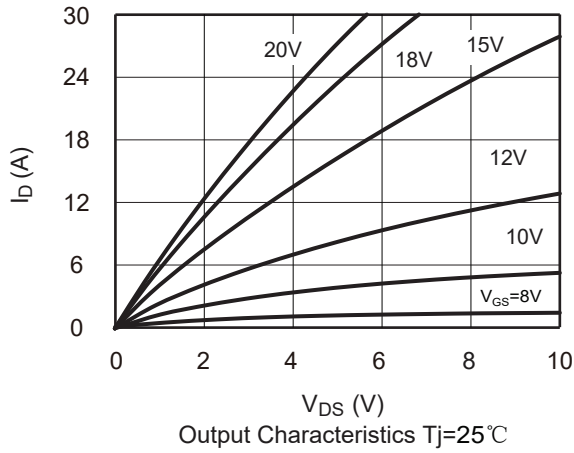
1.The EAS data shows Max. rating . The test condition is $V_{DD}=100V$, $V_{GS}=10V$, $L=30mH$, $I_{AS}=4.5A$.

This product has been designed and qualified for the consumer market.

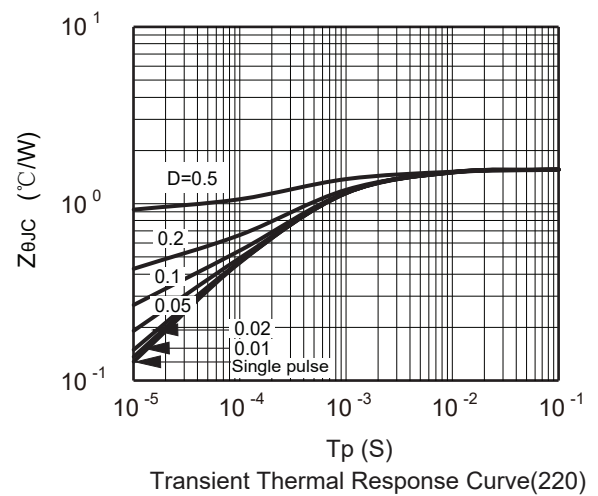
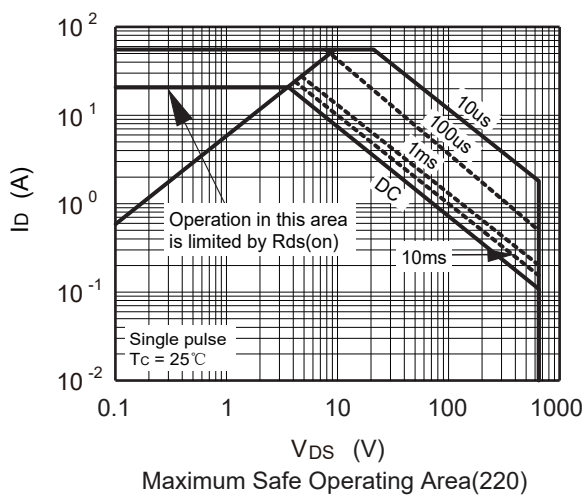
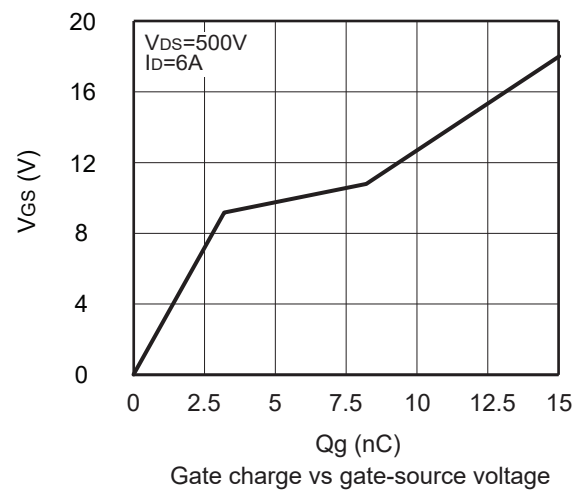
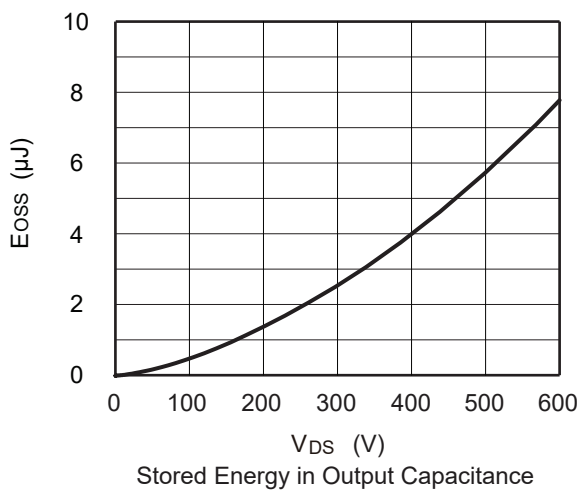
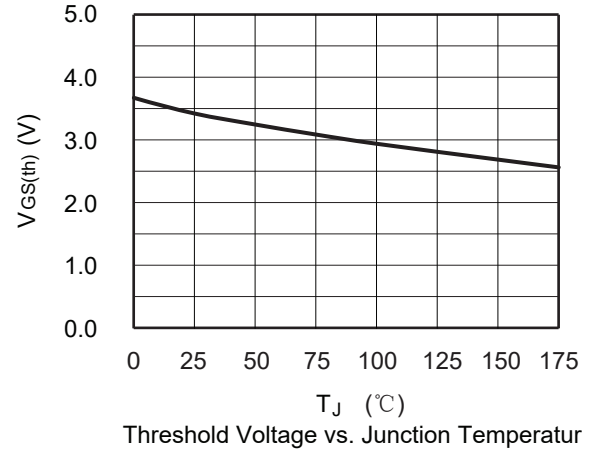
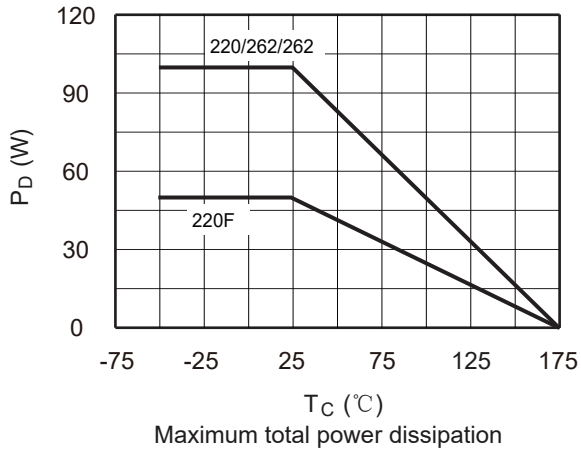
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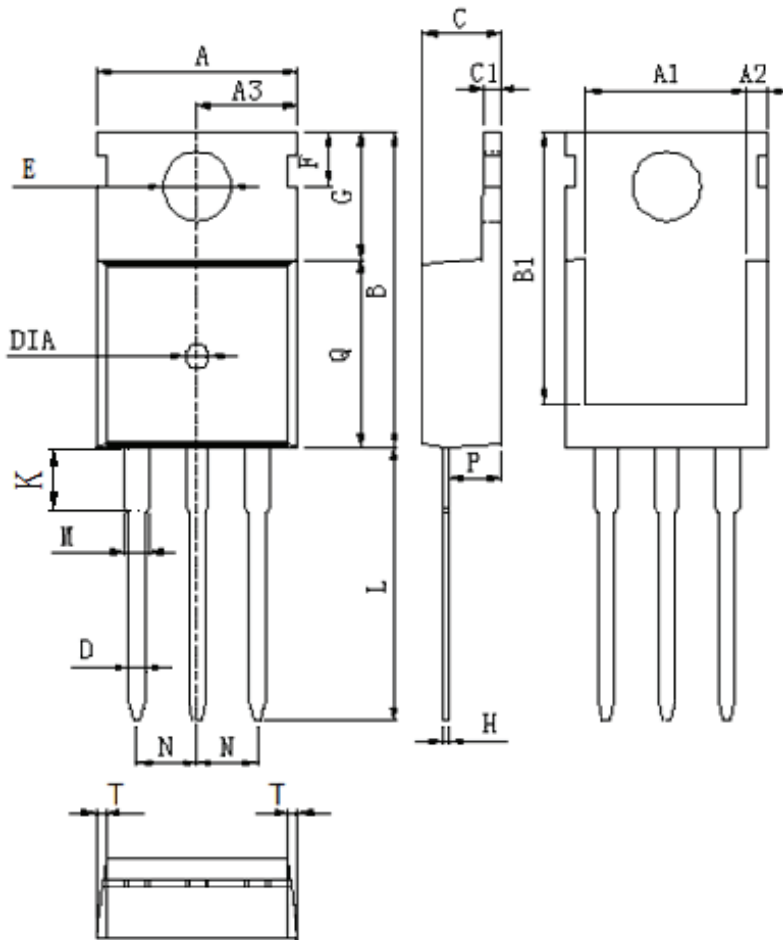
Cmos reserves the right to improve product design, functions and reliability without notice. Please refer to the latest version of specification.

Typical Characteristics



Typical Characteristics



Package Dimension
TO-220
Unit :mm


DIM	MILLIMETERS
A	10.0 ± 0.3
A1	8.64 ± 0.2
A2	1.15 ± 0.1
A3	5.0 ± 0.2
B	15.8 ± 0.4
B1	13.2 ± 0.3
C	4.56 ± 0.1
C1	1.3 ± 0.2
D	0.8 ± 0.2
E	3.6 ± 0.2
F	2.95 ± 0.3
G	6.5 ± 0.3
H	0.5 ± 0.1
K	3.1 ± 0.2
L	13.2 ± 0.4
M	1.25 ± 0.1
N	2.54 ± 0.1
P	2.4 ± 0.3
Q	9.0 ± 0.3
T	W:0.35
DIA	⊙1.5 (deep 0.2)

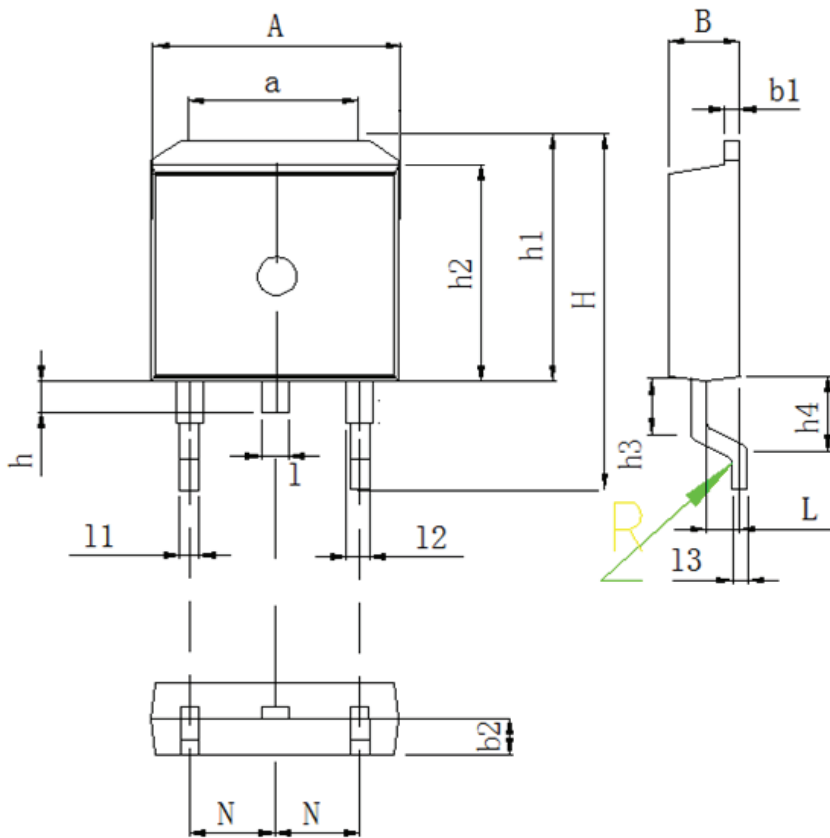
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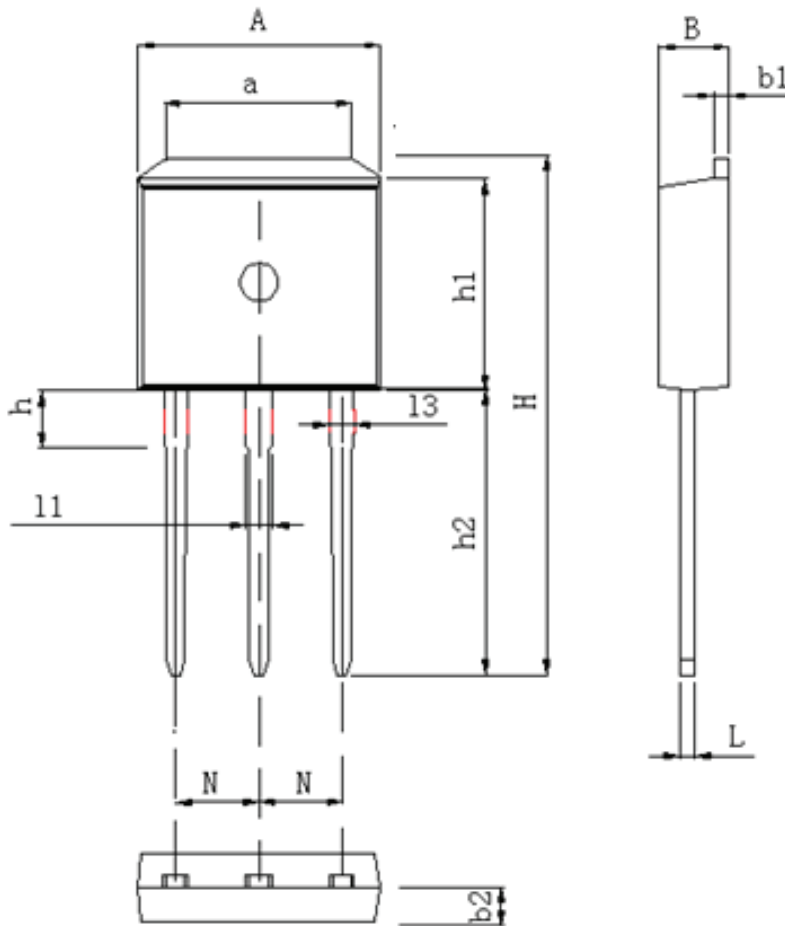
Package Dimension

TO-263

Unit :mm



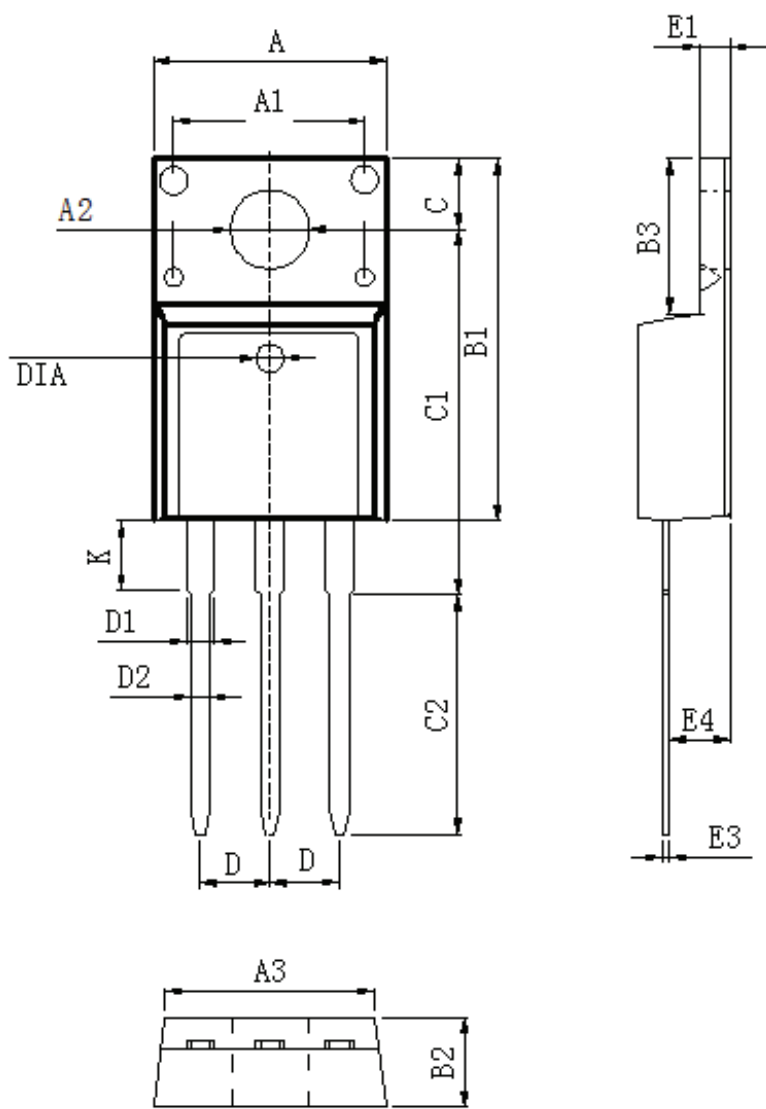
DIM	MILLIMETERS
A	9.8 ± 0.2
a	7.4 ± 0.4
B	4.5 ± 0.2
b1	1.3 ± 0.05
b2	2.4 ± 0.2
H	15.5 ± 0.3
h	1.54 ± 0.2
h1	10.5 ± 0.2
h2	9.2 ± 0.1
h3	1.54 ± 0.2
h4	2.7 ± 0.2
L	2.4 ± 0.2
1	1.3 ± 0.1
11	0.8 ± 0.1
12	1.3 ± 0.1
13	0.5 ± 0.1
N	2.54 ± 0.1
R	$0.5R \pm 0.05$

Package Dimension
TO-262
Unit :mm


DIM	MILLIMETERS
A	9.98 ± 0.2
a	7.4 ± 0.4
B	4.5 ± 0.2
b1	1.3 ± 0.05
b2	2.4 ± 0.2
H	23.9 ± 0.3
h	3.1 ± 0.2
h1	9.16 ± 0.2
h2	13.2 ± 0.2
L	0.5 ± 0.1
l1	1.3 ± 0.1
l2	0.8 ± 0.1
N	2.45 ± 0.1

Package Dimension

TO-220F Unit :mm



DIM	MILLIMETERS
A	10.16±0.3
A1	7.00±0.1
A2	3.3±0.2
A3	9.5±0.2
B1	15.87±0.3
B2	4.7±0.2
B3	6.68±0.4
C	3.3±0.2
C1	12.57±0.3
C2	10.02±0.5
D	2.54±0.05
D1	1.28±0.2
D2	0.8±0.1
K	3.1±0.3
E1	2.54±0.1
E3	0.5±0.1
E4	2.76±0.2
DIA	⌀1.5 (deep 0.2)