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.

Product Summary

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

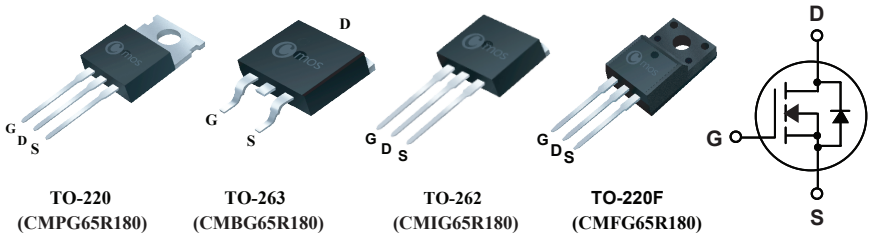
Applications

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

Features

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

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



TO-220 (CMPG65R180) | TO-263 (CMBG65R180) | TO-262 (CMIG65R180) | TO-220F (CMFG65R180)

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℃	Continuous Drain Current	20	20*	A
I_D@T_C=100℃	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℃	Total Power Dissipation	100	50	W
T_{STG}	Storage Temperature Range	-55 to 175		℃
T_J	Operating Junction Temperature Range	-55 to 175		℃

* 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	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-case Max.	1.5	3	℃/W

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Electrical Characteristics (T_J=25℃ , 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℃	---	195	---	
		V_{GS}=15V , I_D=6A	---	280	---	
		V_{GS}=15V , I_D=6A , T_J=175℃	---	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℃	---	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	---	pF
$C_{o(tr)}$	Time Related Output Capacitance		---	65	---	
$T_{d(on)}$	Turn-On Delay Time	V_{GS}=0V / 18V , V_{DS}=500V R_G =10Ω , I_D=6A FWD = 650V 4A SiC Diode Inductive load	---	8.5	---	ns
T_r	Rise Time		---	14.5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	19	---	
T_f	Fall Time		---	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℃	---	4.1	---	V
t_{rr}	Reverse Recovery Time	di/dt=600A/μs , Includes Q_{OSS} V_{DD} =500V , I_{SD} =6A , T_J =25℃	---	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.

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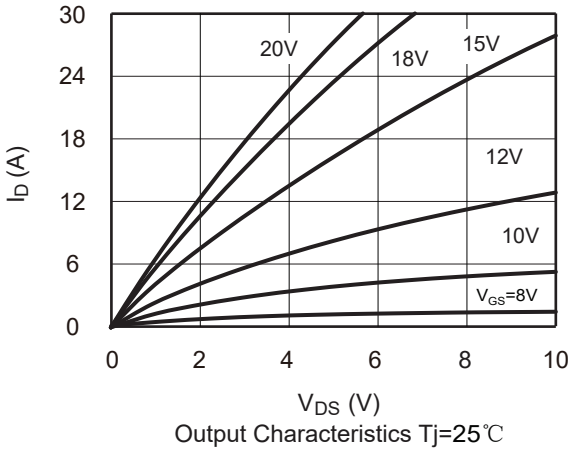
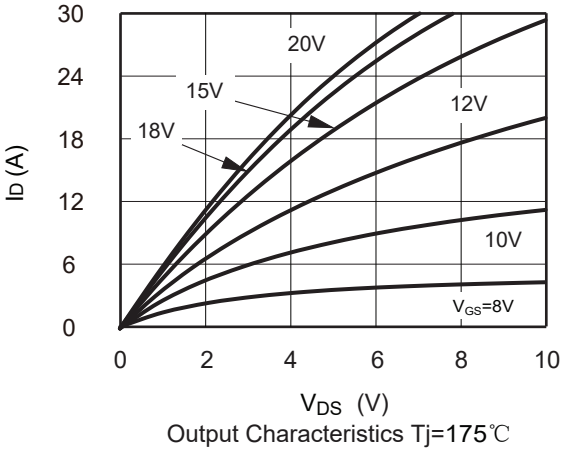
Cmos reserver the right to improve product design ,functions and reliability wihtout notice.Please refer to the latest version of specification.

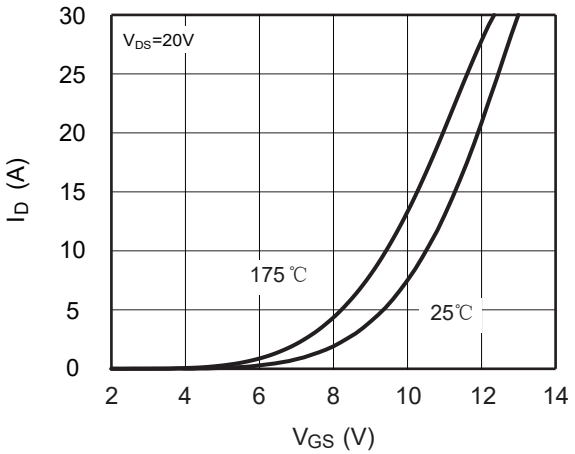
Typical Characteristics



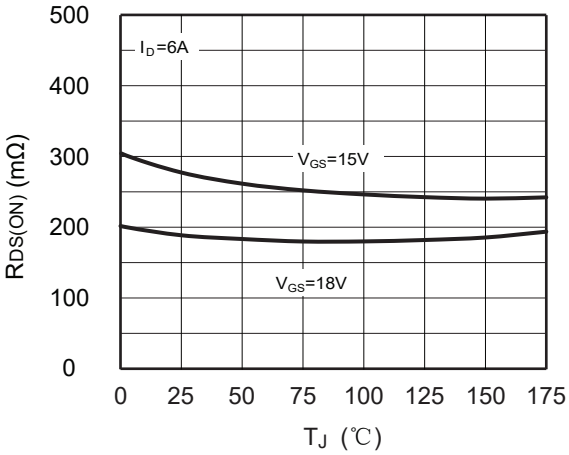
Output Characteristics Tj=25℃



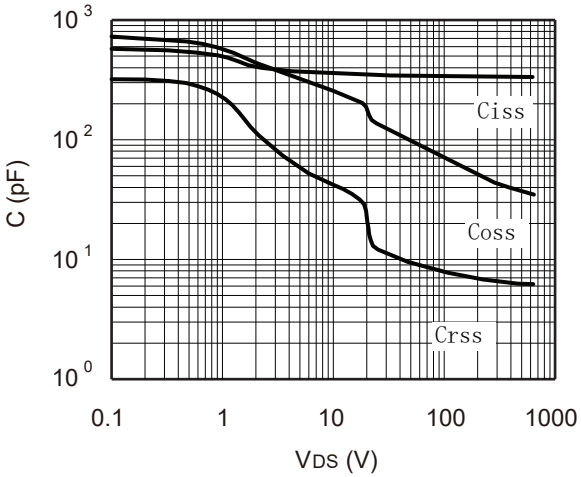
Output Characteristics Tj=175℃



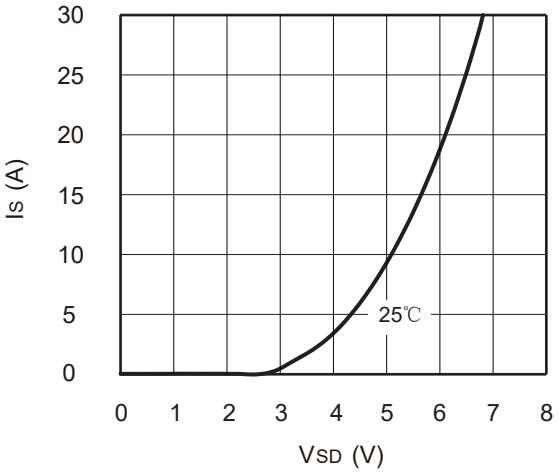
Transfer Characteristics



On-Resistance vs. temperature



Capacitance Characteristics



Body-Diode Characteristics

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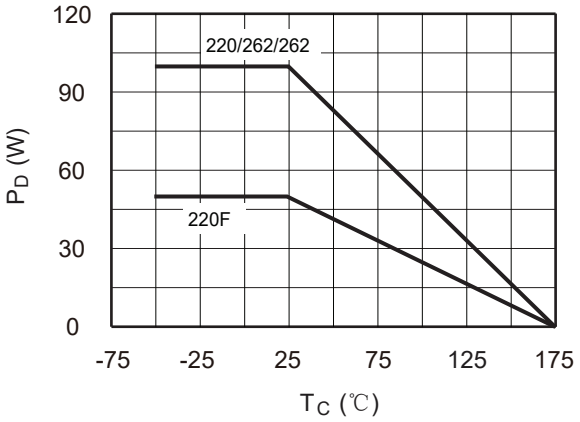
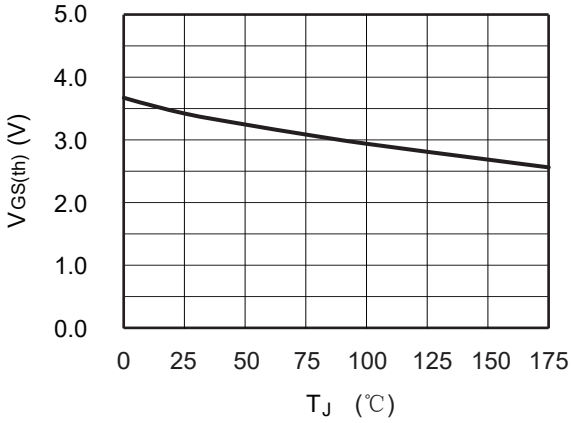
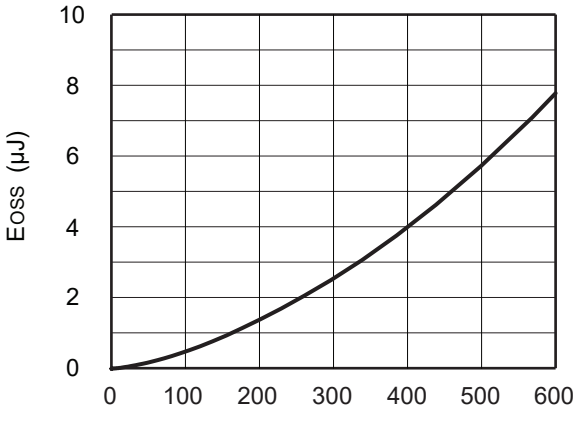
Typical Characteristics



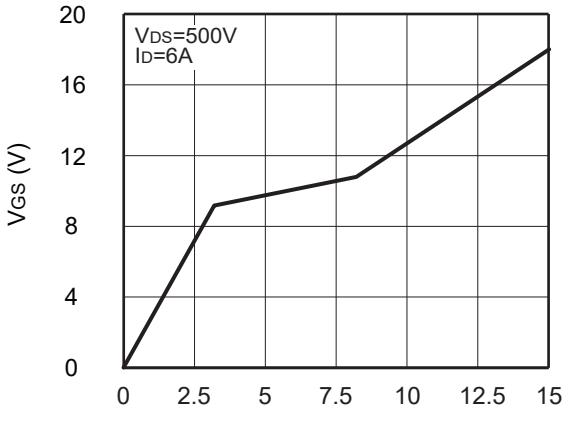
Maximum total power dissipation



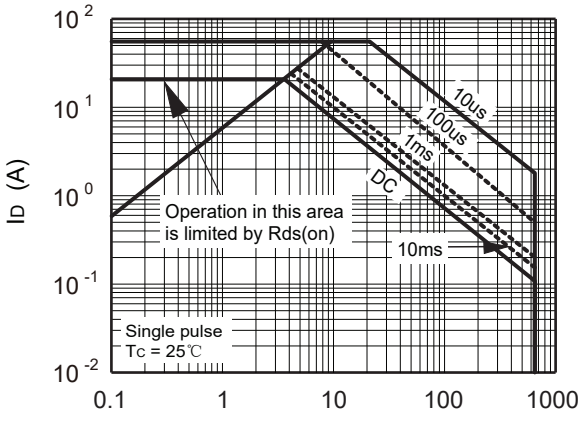
Threshold Voltage vs. Junction Temperatur



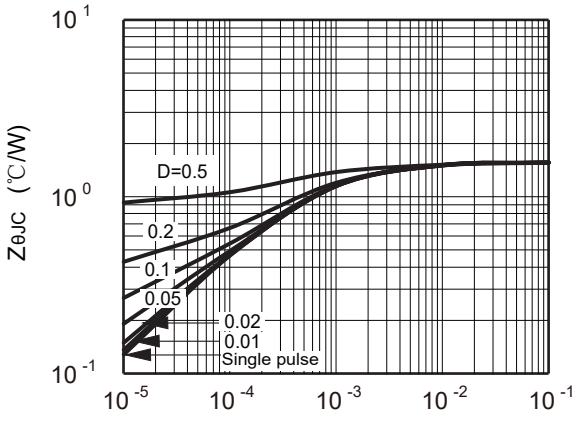
Stored Energy in Output Capacitance



Gate charge vs gate-source voltage



Maximum Safe Operating Area(220)



Transient Thermal Response Curve(220)

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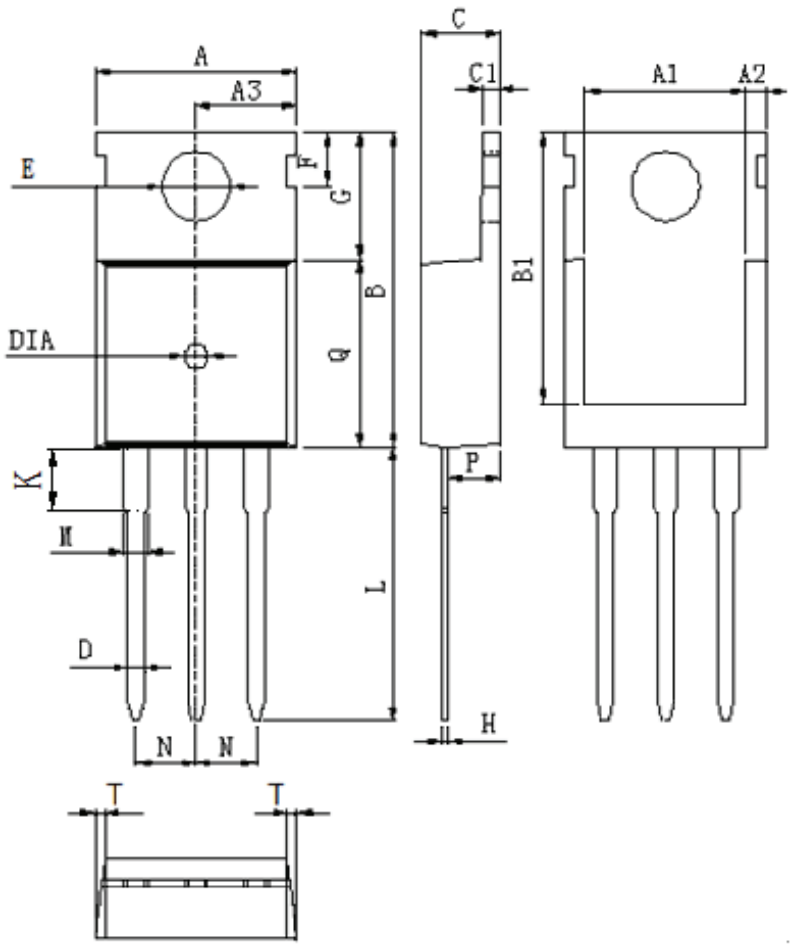
Package Dimension

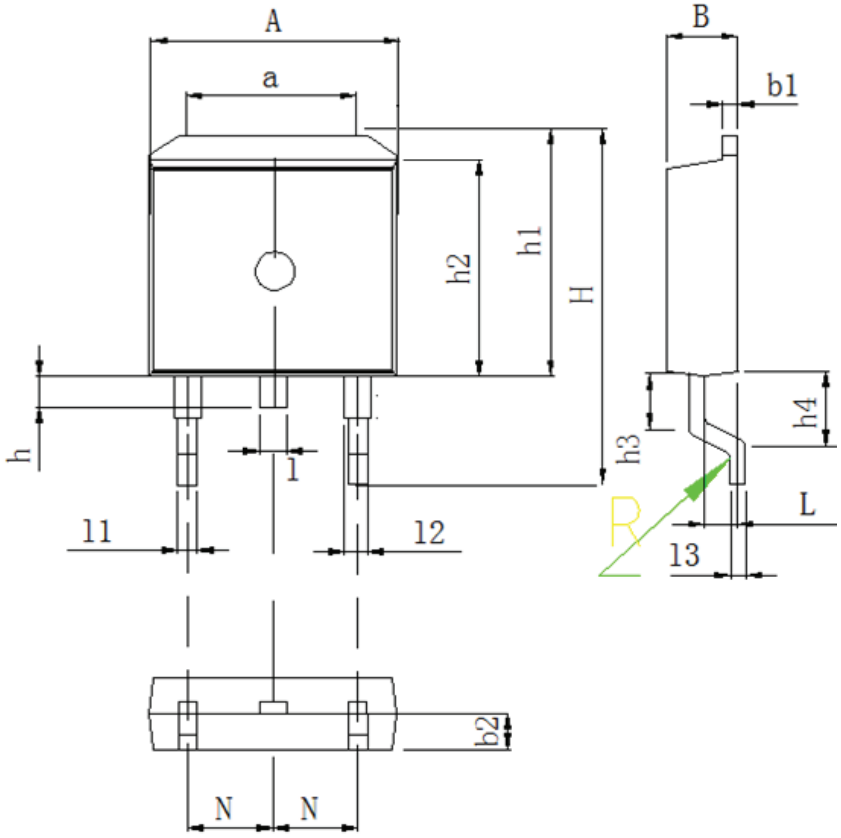
TO-220 Unit :mm



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)

Package Dimension

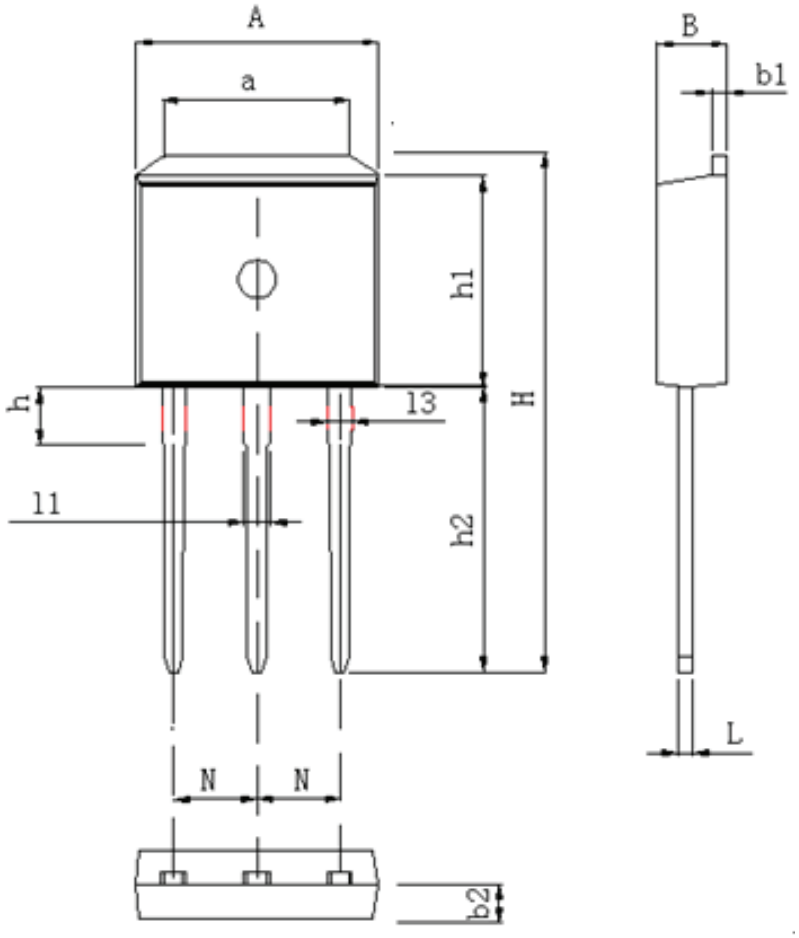
TO-263 Unit :mm



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
l	1.3±0.1
l1	0.8±0.1
l2	1.3±0.1
l3	0.5±0.1
N	2.54±0.1
R	0.5R±0.05

Package Dimension

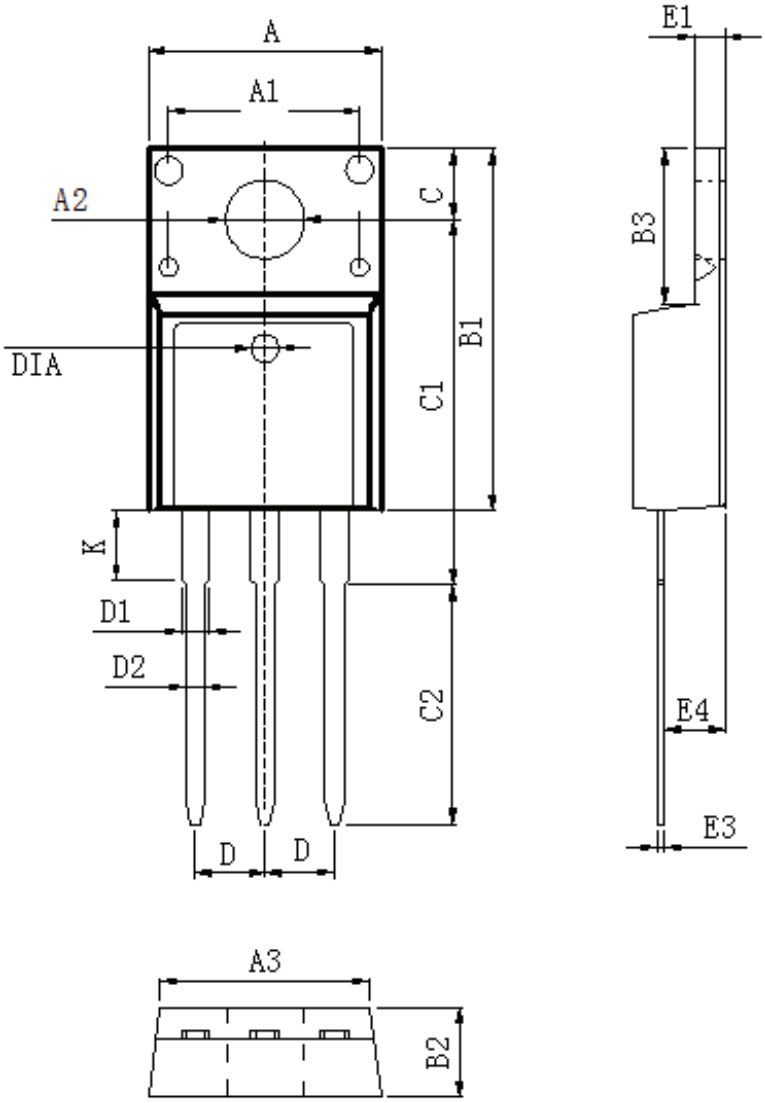
TO-262 Unit :mm



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)