

CMPG65R325/CMBG65R325/CMIG65R325/CMFG65R325

650V, 370mΩ typ., 12A 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

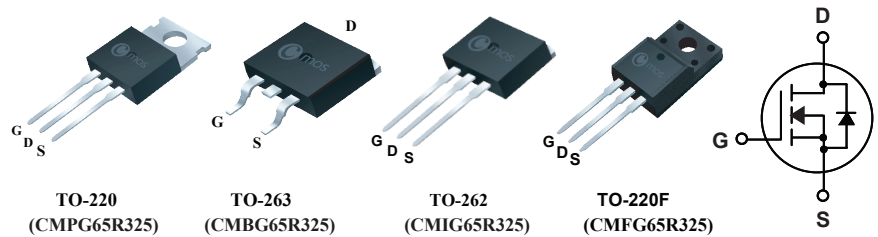
Product Summary

BVDSS	$R_{DS(on)}$ max.	ID
650V	440mΩ	12A

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	12	12*	A
$I_D@T_C=100^\circ C$	Continuous Drain Current	8.4	8.4*	A
I_{DM}	Pulsed Drain Current	32	32*	A
EAS	Single Pulse Avalanche Energy (Note 1)	101		mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation	80	40	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.	1.88	3.75	$^\circ C/W$

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Electrical Characteristics (T_J=25°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 =4A	---	370	440	mΩ
		V _{GS} =18V, I _D =4A, T _J =175°C	---	400	---	
		V _{GS} =15V, I _D =4A	---	580	---	
		V _{GS} =15V, I _D =4A, T _J =175°C	---	520	---	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =1.5mA (tested after V _{GS} =22V, 1ms pulse)	2.0	3.4	5.0	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°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	---	4.5	---	Ω
Q _{g(tot)}	Total Gate Charge	V _{DS} =500V, I _D =4A V _{GS} =0V to 18V	---	8	---	nC
Q _{gs}	Gate-Source Charge		---	6.6	---	
Q _{gd}	Gate-Drain Charge		---	1.9	---	
E _{oss}	Stored Energy in Output Capacitance	V _{GS} =0V, V _{DS} =0V to 500V	---	3.3	---	μJ
C _{o(er)}	Energy Related Output Capacitance		---	26	---	pF
C _{o(tr)}	Time Related Output Capacitance		---	37	---	
E _{on}	Turn-on Switching Energy	V _{DS} =500V I _D =4A V _{GS} =0V / 18V	---	22.5	---	μJ
E _{off}	Turn-off Switching Energy		---	6.2	---	
E _{tot}	Total Switching Energy		---	28.7	---	
T _{d(on)}	Turn-On Delay Time	R _G =10Ω FWD = 650V 4A SiC Diode Inductive load	---	6.5	---	ns
T _r	Rise Time		---	12	---	
T _{d(off)}	Turn-Off Delay Time		---	12.6	---	
T _f	Fall Time		---	11.5	---	
C _{iss}	Input Capacitance	V _{DS} =100V, V _{GS} =0V, f=1MHz	---	185	---	pF
C _{oss}	Output Capacitance		---	55	---	
C _{rss}	Reverse Transfer Capacitance		---	13	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	12	A
I _{SM}	Pulsed Source Current		---	---	32	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =4A, T _J =25°C	---	4.7	---	V
t _{rr}	Reverse Recovery Time	di/dt=600A/μs, Includes Q _{OSS} V _{DD} =500V, I _{SD} =4A, T _J =25°C	---	7.7	---	ns
Q _{rr}	Reverse Recovery Charge		---	11	---	nC
I _{rrm}	Peak Reverse Recovery Current		---	2.3	---	A

Note :

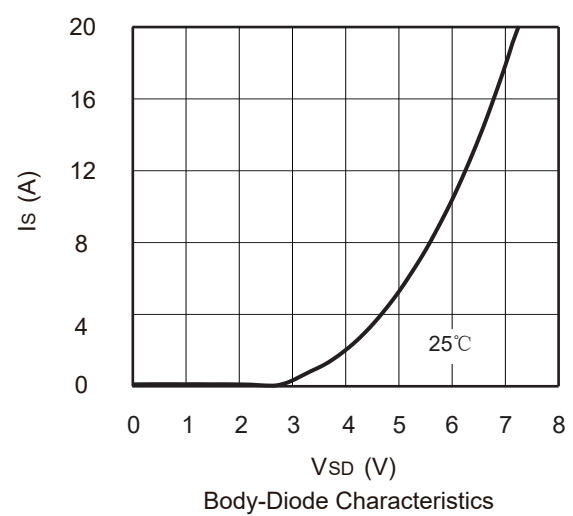
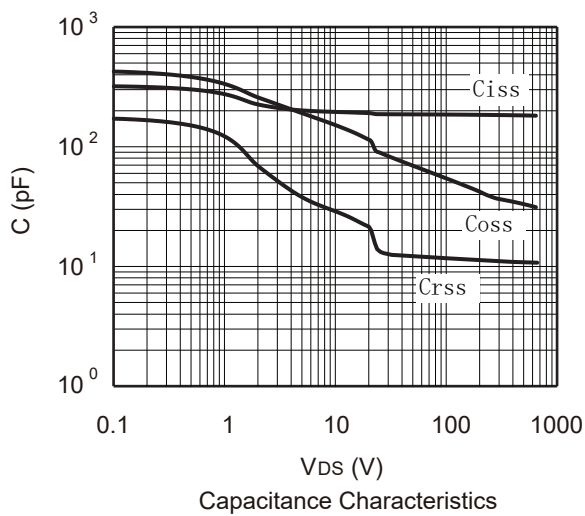
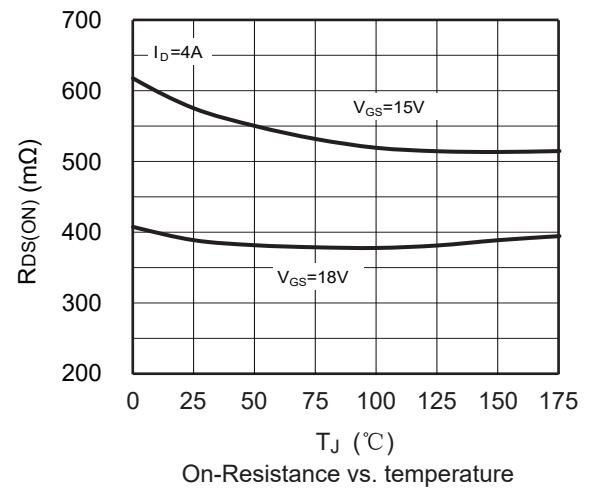
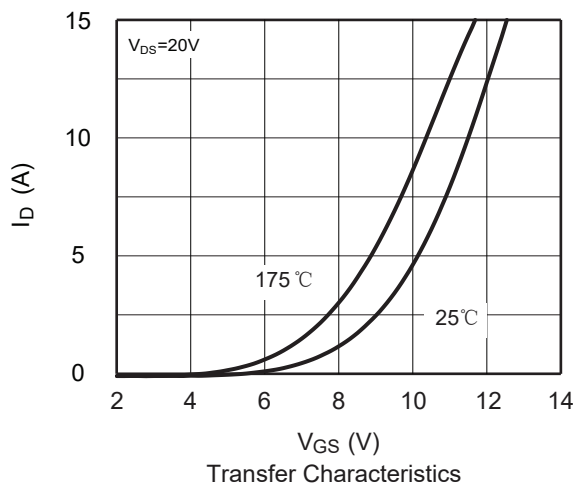
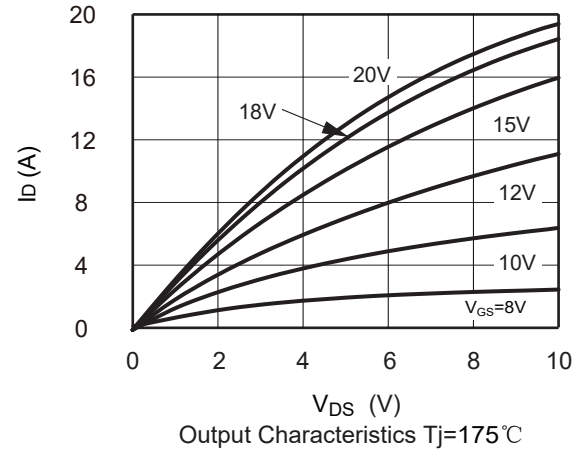
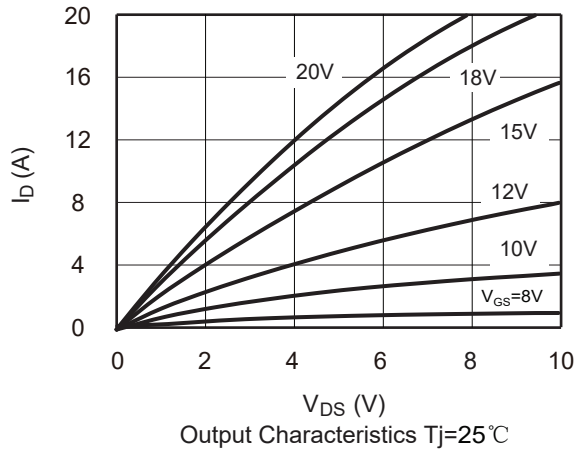
1.The EAS data shows Max. rating . The test condition is V_{DD}=100V, V_{GS}=10V, L=10mH, I_{AS}=4.5A.

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

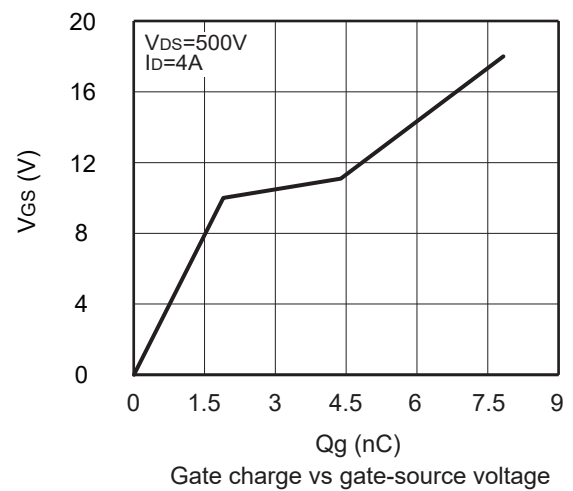
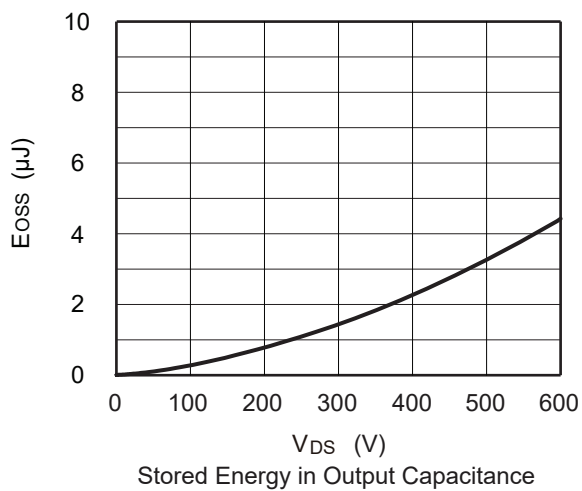
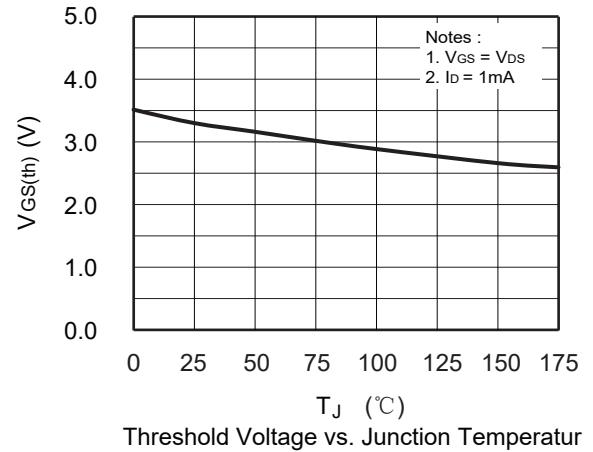
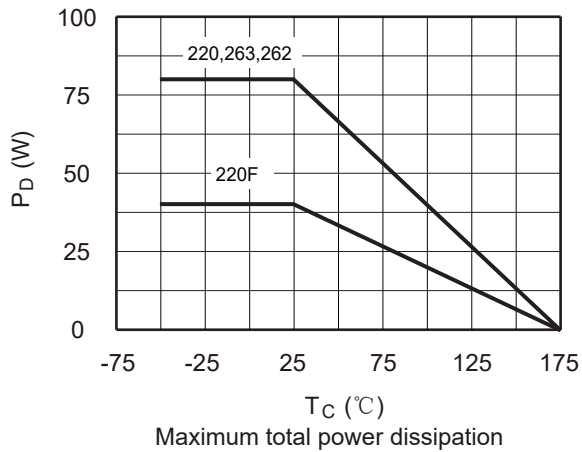
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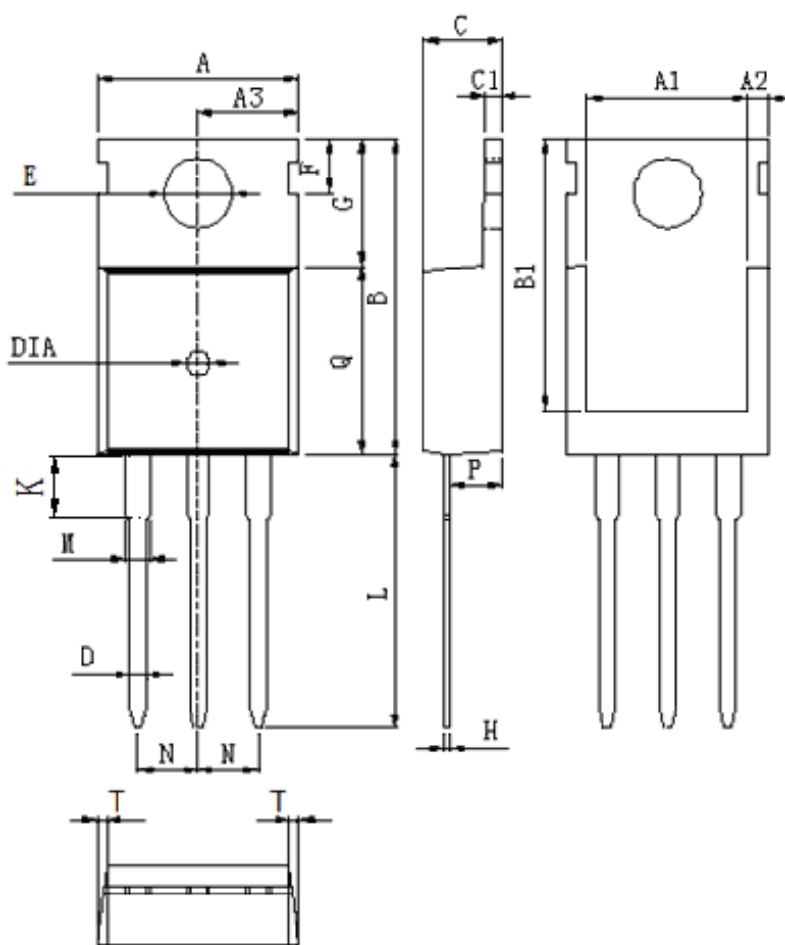
Cmos reserves the right to improve product design, functions and reliability without notice. Please refer to the latest version of specification.

Typical Characteristics

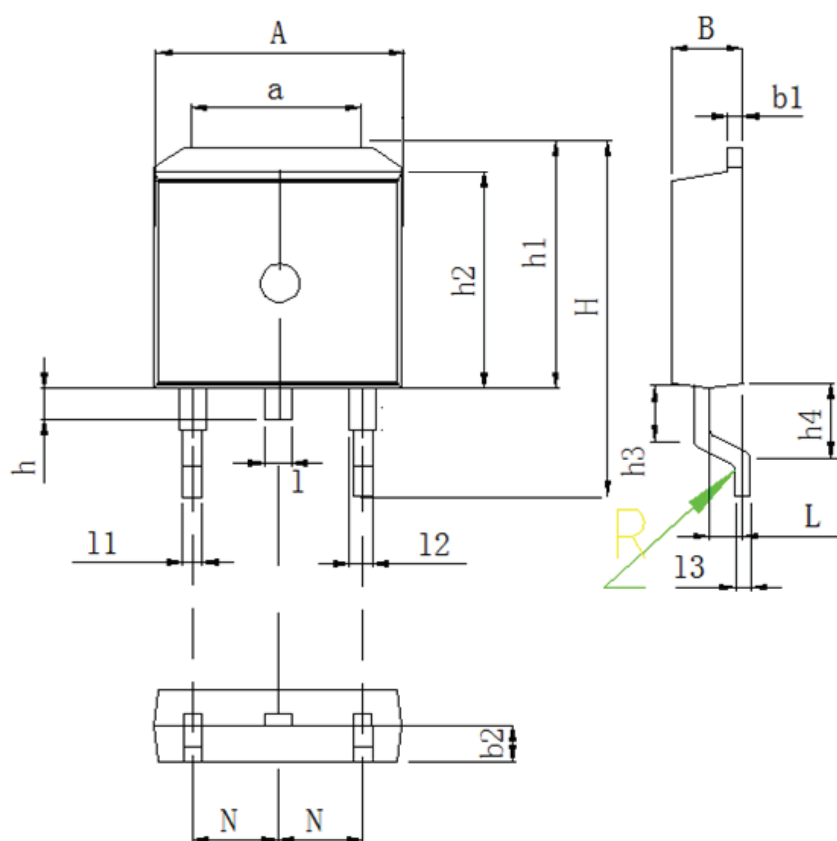


Typical Characteristics



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)

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	$0.5R \pm 0.05$

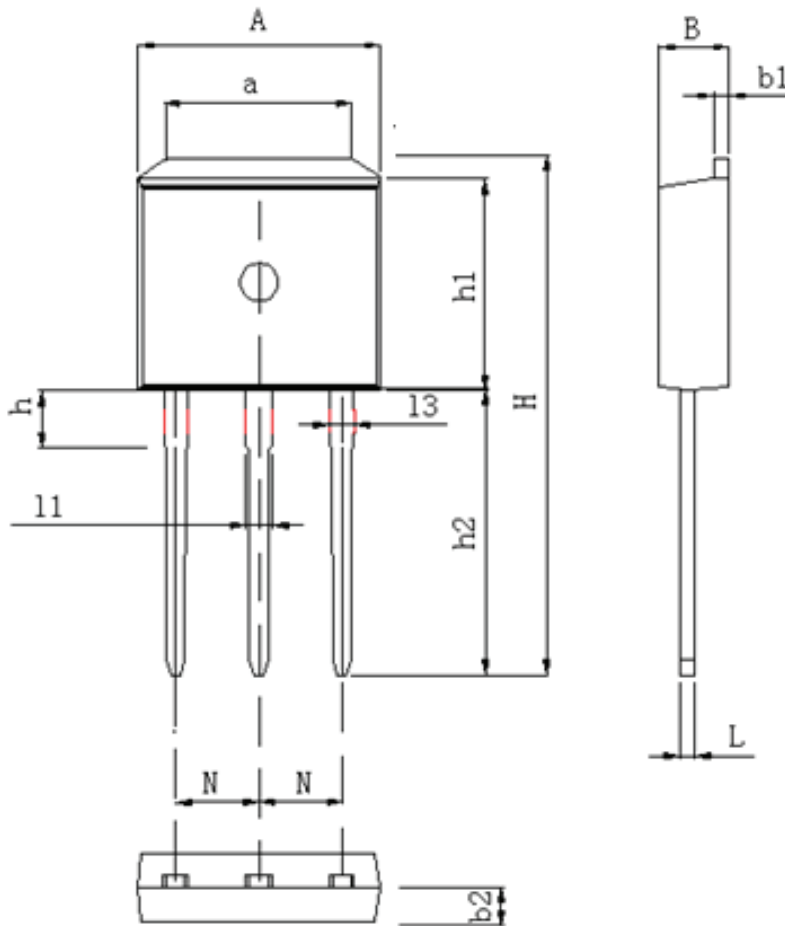
CMPG65R325/CMBG65R325/CMIG65R325/CMFG65R325

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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
11	1.3 ± 0.1
12	0.8 ± 0.1
N	2.45 ± 0.1

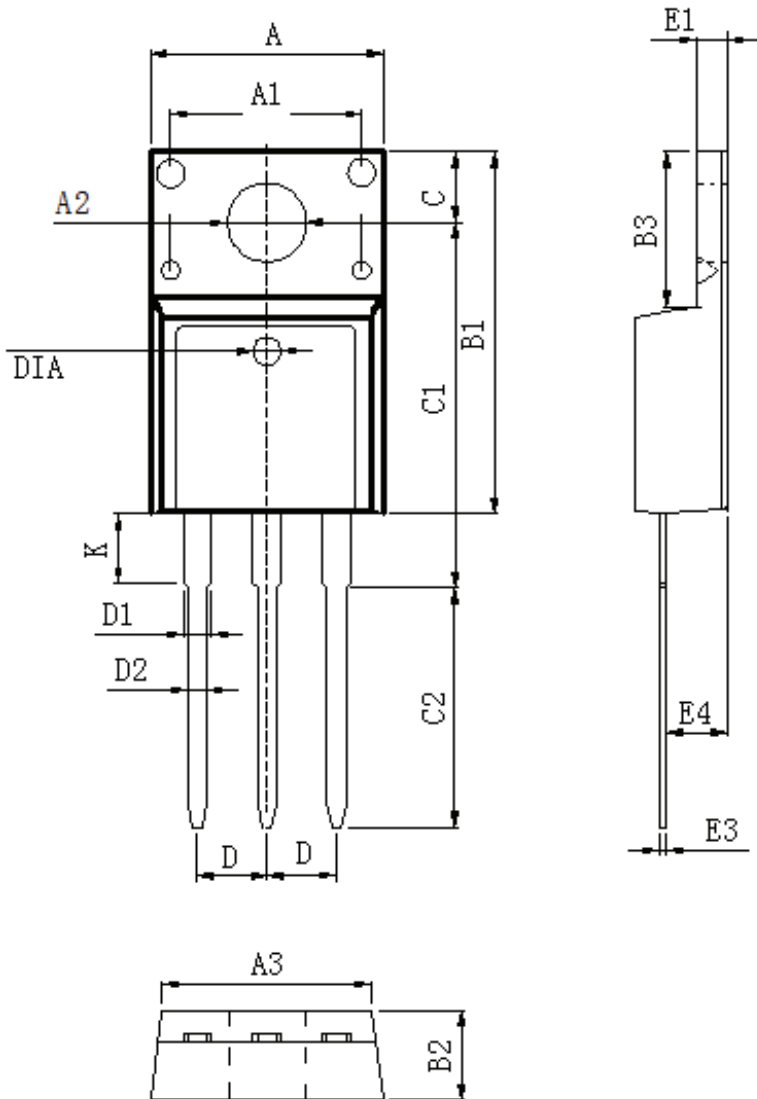
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Package Dimension

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)