CMHG65R048/CMAG65R048

650V, 45mΩ typ., 44A 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	63mΩ	44A

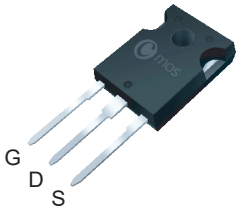
Applications

- inverter
- EV charging infrastructure
- uninterruptable power supplies

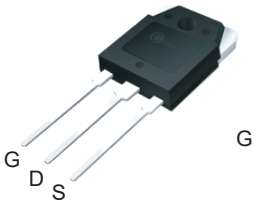
Features

- High switching speed with a low gate charge
- Fast intrinsicdiode with low reverse recovery
- 100% Avalanche Tested
- RoHS Compliant

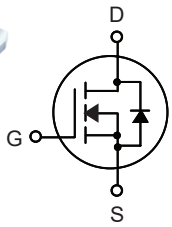
TO-247/TO-3P Pin Configuration



TO-247
CMHG65R048



TO-3P
CMAG65R048



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Absolute maximum values	-10/+22	V
V_{GSop}	Recommended operational values	-5/+18	V
I_D@T_C=25℃	Continuous Drain Current	44	A
I_D@T_C=100℃	Continuous Drain Current	31	A
I_{DM}	Pulsed Drain Current	120	A
P_D@T_C=25℃	Total Power Dissipation	150	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient	---	40	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-case	---	1	℃/W

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

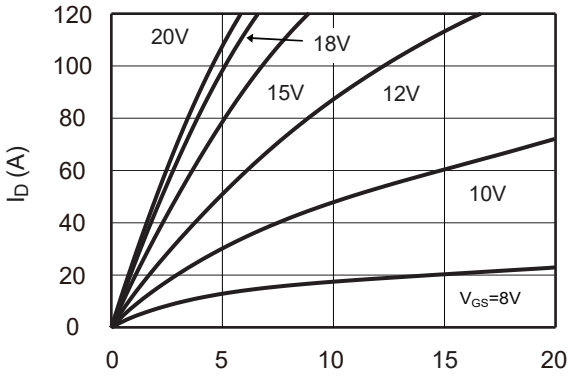
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=1mA	650	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=18V , I_D=20A	---	45	63	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =7mA (tested after V_{GS}=22V,1ms pulse)	1.8	2.6	4.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=650V , V_{GS} =0V	---	1	100	μA
		V_{DS}=650V , V_{GS} =0V , T_J=175℃	---	10	---	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=+22V , V_{DS} =0V	---	---	+100	nA
		V_{GS}= -10V , V_{DS} =0V	---	---	-100	
gfs	Forward Transconductance	V_{DS}=20V , I_D =20A	---	52	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	4.0	---	Ω
$Q_{g(tot)}$	Total Gate Charge	V_{DS} =400V , I_D=20A V_{GS}=-5V / 18V	---	56	---	nC
Q_{gs}	Gate-Source Charge		---	14	---	
Q_{gd}	Gate-Drain Charge		---	15	---	
E_{oss}	Stored Energy in Output Capacitance	V_{DS}=0V to 400V V_{GS} =0V	---	13	---	μJ
$C_{o(er)}$	Energy Related Output Capacitance		---	162	---	pF
$C_{o(tr)}$	Time Related Output Capacitance		---	236	---	
E_{on}	Turn-on Switching Energy	V_{DS} =400V I_D =20A V_{GS}=-5V / 18V R_G =2.7Ω FWD = 650V 12A SiC Diode Inductive load	---	111	---	μJ
E_{off}	Turn-off Switching Energy		---	14	---	
E_{tot}	Total Switching Energy		---	125	---	
$T_{d(on)}$	Turn-On Delay Time		---	16	---	ns
T_r	Rise Time		---	24	---	
$T_{d(off)}$	Turn-Off Delay Time		---	27	---	
T_f	Fall Time		---	7	---	
C_{iss}	Input Capacitance	V_{DS}=400V , V_{GS}=0V , f=250kHz	---	1050	---	pF
C_{oss}	Output Capacitance		---	130	---	
C_{rss}	Reverse Transfer Capacitance		---	9	---	

Diode Characteristics

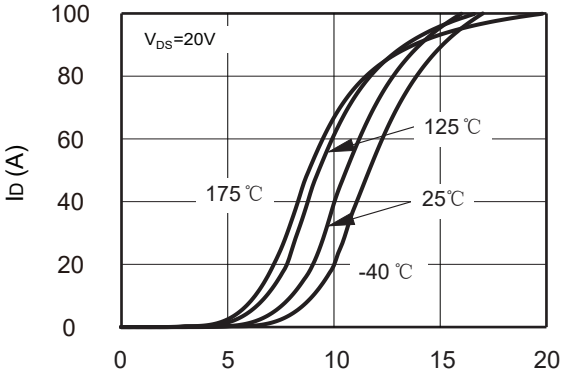
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	44	A
I_{SM}	Pulsed Source Current		---	---	120	A
V_{SD}	Diode Forward Voltage	V_{GS}=-5V , I_{SD}=20A ,T_J=25℃	---	4.3	---	V
t_{rr}	Reverse Recovery Time	di/dt=1000A/μs , Includes Q_{OSS} V_{DD}=400V , I_{SD}=20A	---	17	---	ns
Q_{rr}	Reverse Recovery Charge		---	104	---	nC

Note :
This product has been designed and qualified for the counsumer market.
Cmos assumes no liability for customers' product design or applications.
Cmos reserver the right to improve product design ,functions and reliability wihtout notice.Please refer to the latest version of specification.

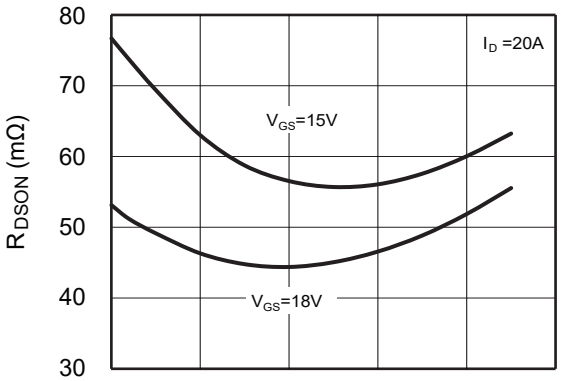
Typical Characteristics



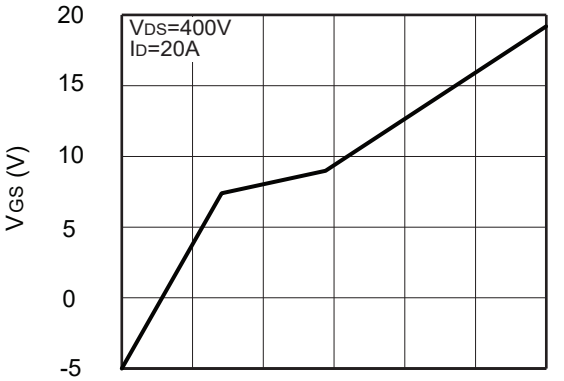
Output Characteristics



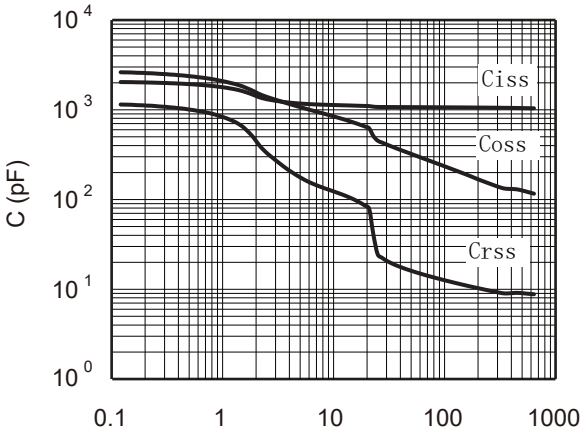
transfer characteristics



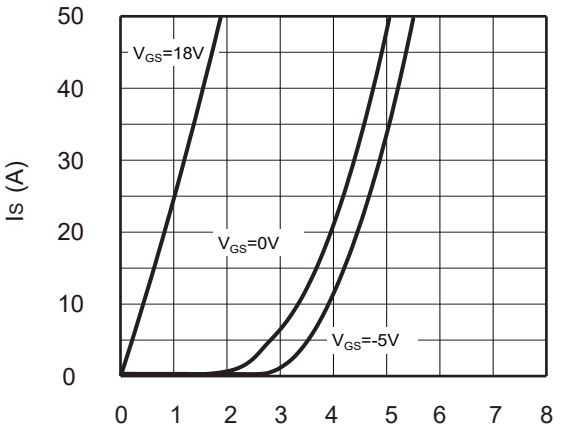
On-Resistance vs. temperature



Gate charge vs gate-source voltage

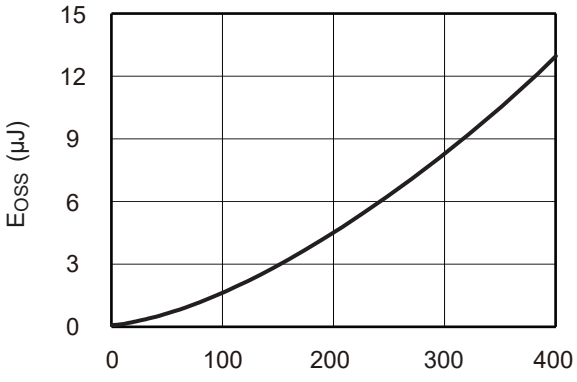


Capacitance Characteristics

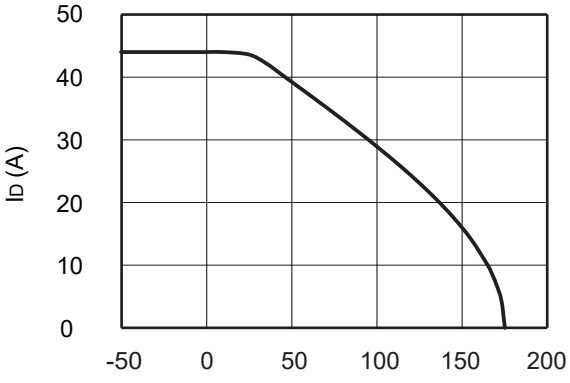


Body-Diode Characteristics

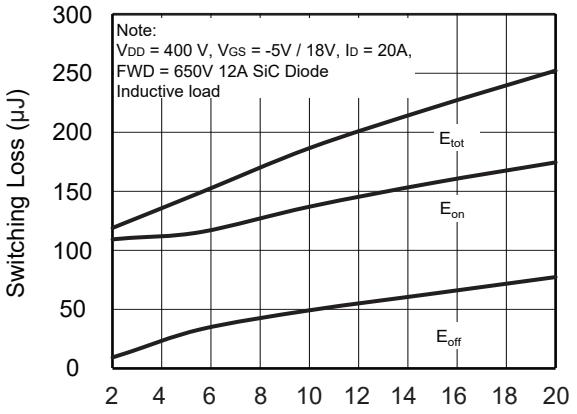
Typical Characteristics



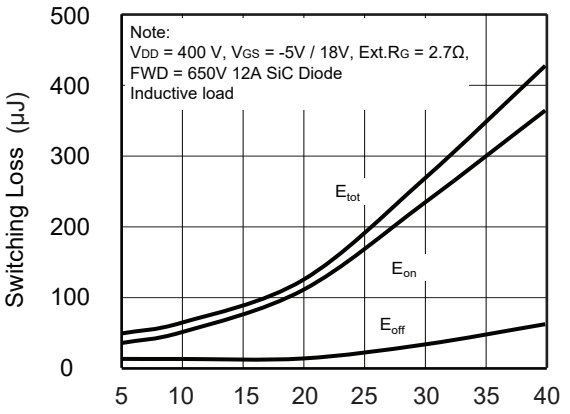
Stored Energy in Output Capacitance



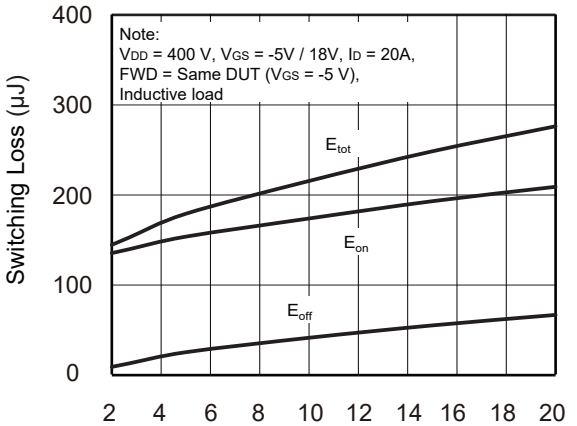
Continuous Drain Current Derating vs. Case Temperature



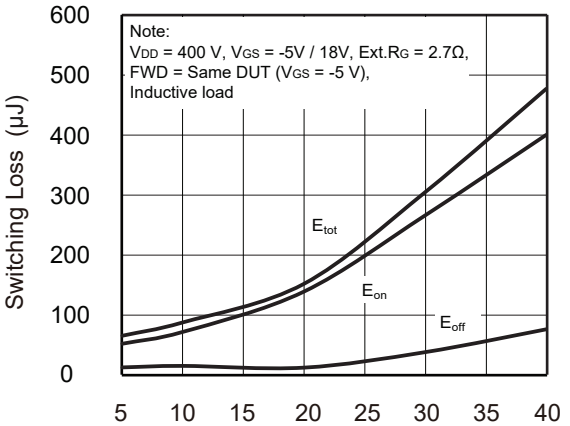
Switching Losses vs. Drain Current



Switching Losses vs. Drain Current

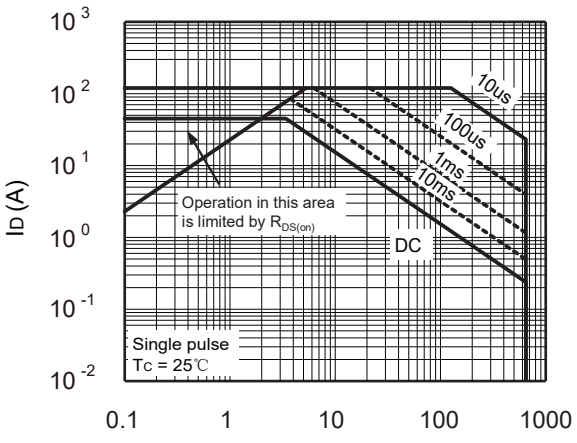


Switching Losses vs. Gate Resistance

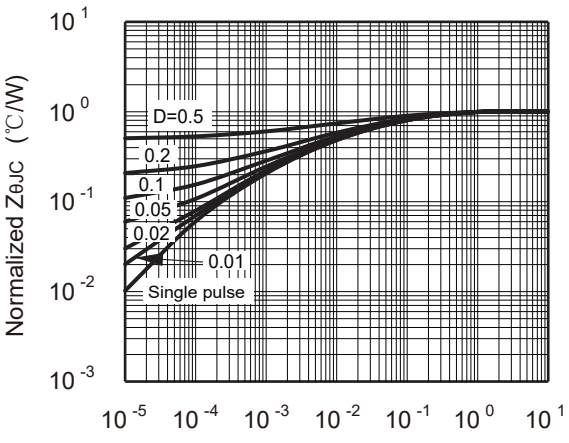


Switching Losses vs. Drain Current

Typical Characteristics



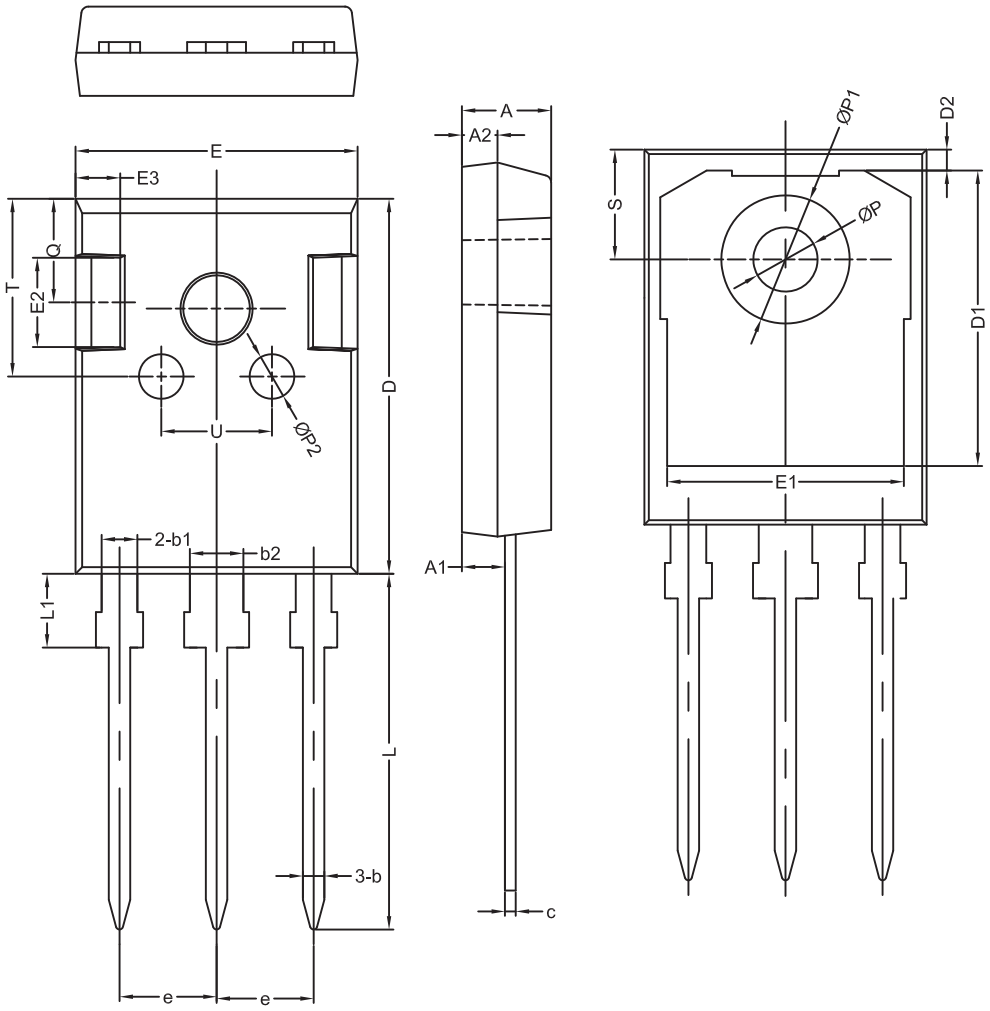
Maximum Safe Operating Area



Transient Thermal Response Curve

Package Dimension

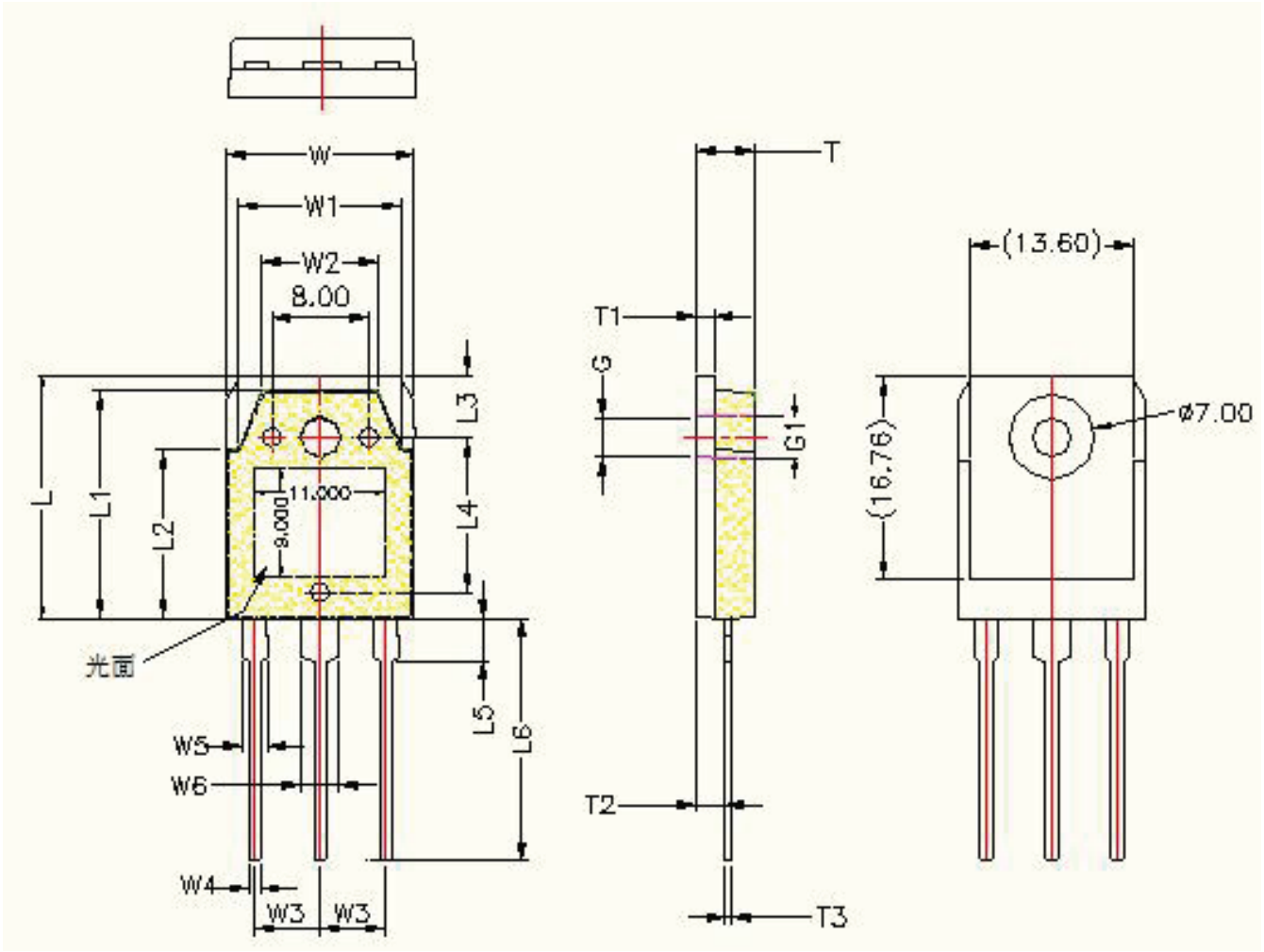
TO-247 Unit :mm



符号	机械尺寸/mm			符号	机械尺寸/mm		
	最小值	典型值	最大值		最小值	典型值	最大值
A	4.80	5.00	5.20	E2		5.00	
A1	2.21	2.41	2.61	E3		2.50	
A2	1.90	2.00	2.10	e		5.44	
b	1.10	1.20	1.35	L	19.42	19.92	20.42
b1		2.00		L1		4.13	
b2		3.00		P	3.50	3.60	3.70
c	0.55	0.60	0.75	P1		7.19	
D	20.80	21.00	21.20	P2		2.50	
D1		16.55		Q		5.80	
D2		1.20		S	6.05	6.15	6.25
E	15.60	15.80	16.0	T		10.00	
E1		13.30		U		6.20	

Package Dimension

TO-3P Unit :mm



Symbol	Dimensions	Symbol	Dimensions	Symbol	Dimensions
W	15.60±0.3	L	19.90±0.3	T	4.80±0.3
W1	13.60±0.3	L1	18.70±0.3	T1	1.50±0.3
W2	9.60±0.3	L2	13.90±0.3	T2	2.40±0.3
W3	5.45(TYP)	L3	5.00±0.3	T3	0.60±0.3
W4	1.00±0.3	L4	12.76±0.3	G	Ø3.25±0.3
W5	2.10±0.2	L5	3.50±0.3	G1	Ø3.58±0.3
W6	3.10±0.2	L6	20.00±0.3		