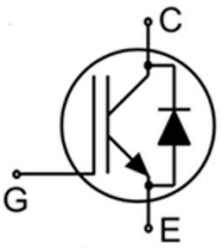
Trench Field-Stop Technology IGBT

Features

- 650V, 30A
- $V_{CE(sat)(typ.)}$ =1.9V@V_{GE}=15V, I_C=25A
- Maximum Junction Temperature 175℃
- Pb-free Lead Plating; RoHS Compliant



TO220F

TO247

TO220

Applications

- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching Frequency Converters

Key Performance and Package Parameters

Order codes	V_{CE}	I_C	V_{CEsat}, T_{vj}=25℃	T_{vjmax}	Marking	Package
XD030H065AY1L3	650V	30A	1.9V	175℃	D25H65AY1	TO220
XD030H065AY1S3	650V	30A	1.9V	175℃	D25H65AY1	TO247
XD030H065AY1H3	650V	30A	1.9V	175℃	D25H65AY1	TO220F

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Continuous Collector Current (T_C=25℃)	60	A
	Continuous Collector Current (T_C=100℃)	30	A
I_{CM}	Pulsed Collector Current (Note 1)	120	A
P_D	Maximum Power Dissipation (TO220)	136	W
	Maximum Power Dissipation (TO247)	166	W
T_J	Operating Junction Temperature Range	-40 to 175	℃
T_{STG}	Storage Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Conditions	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	TO220	1.1	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	TO247	0.9	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	TO220F	1.4	℃/W

Electrical Characteristics (T_C=25℃ unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V, I_C=200uA	650	---	---	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}=650V, V_{GE}=0V	---	---	40	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=20V, V_{CE}=0V	---	---	100	nA
	Gate Leakage Current, Reverse	V_{GE}=-20V, V_{CE}=0V	---	---	100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}=V_{CE}, I_C=600uA	5	6	7	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=30A, T_j=25℃	---	1.9	2.3	V
Q_G	Total Gate Charge	V_{CC}=520V V_{GE}=15V I_C=30A	---	29.2	---	nC
Q_{GE}	Gate-Emitter Charge		---	4.7	---	nC
Q_{GC}	Gate-Collector Charge		---	17	---	nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=±15V I_C=15A R_G=20Ω Inductive Load T_C=25℃	---	8.3	---	ns
t_r	Turn-on Rise Time		---	29	---	ns
$t_{d(off)}$	Turn-off Delay Time		---	118	---	ns
t_f	Turn-off Fall Time		---	57	---	ns
E_{on}	Turn-on Switching Loss		---	0.22	---	mJ
E_{off}	Turn-off Switching Loss		---	0.34	---	mJ
E_{ts}	Total Switching Loss		---	0.56	---	mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f =1MHz	---	1230	---	pF
C_{oes}	Output Capacitance		---	132	---	pF
C_{res}	Reverse Transfer Capacitance		---	39	---	pF

Diode Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=30A, T_j=25℃	---	1.7	2.2	V
t_{rr}	Diode Reverse Recovery Time	VR=400V I_F=15A dI_F/dt=350A/us T_C=25℃	---	46	---	ns
I_{rr}	Diode peak Reverse Recovery Current		---	3.8	---	A
Q_{rr}	Diode Reverse Recovery Charge		---	216	---	nC

Note1：Repetitive rating, pulse width limited by maximum junction temperature

Typical Characteristics

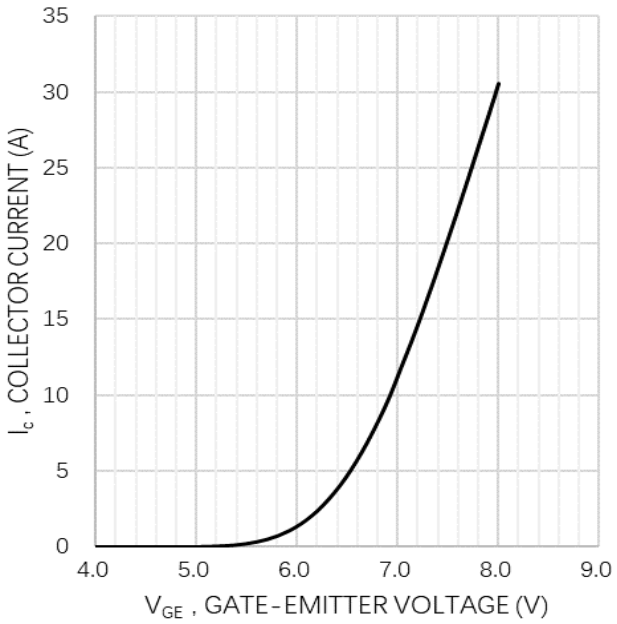


Fig. 1 Typical transfer characteristics (V_{CE}=20V)

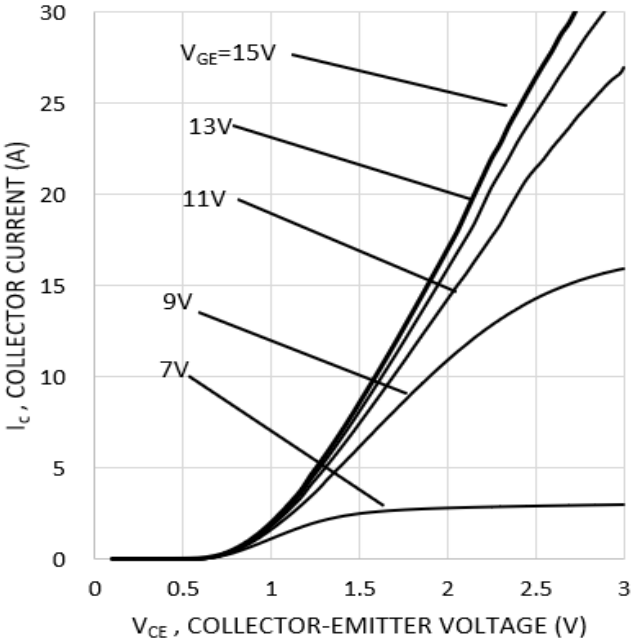


Fig. 2 Typical output characteristic (T_{vj}=25℃)

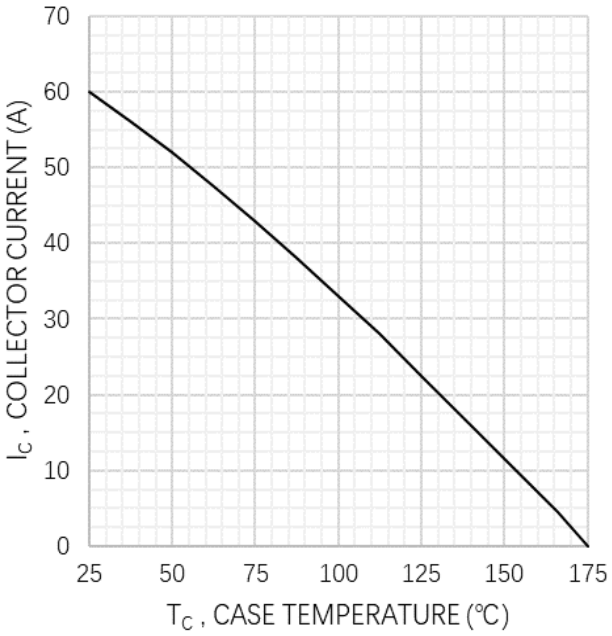


Fig. 3 Collector current as a function of case temperature (V_{GE}≥15V,T_{vj}≤175℃)

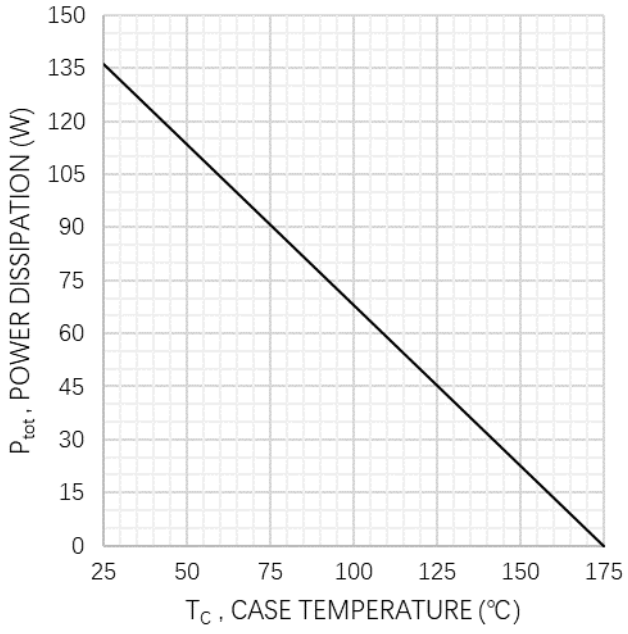


Fig. 4 Power dissipation as a function of case temperature (TO220)

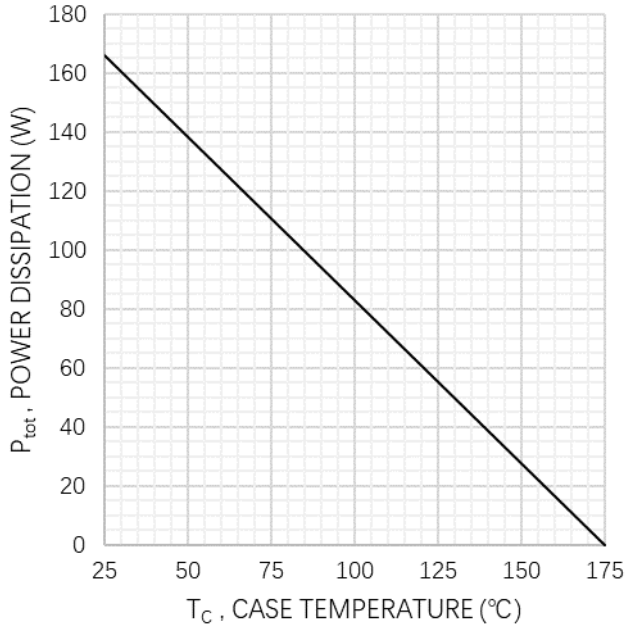


Fig. 5 Power dissipation as a function of case temperature (TO247)

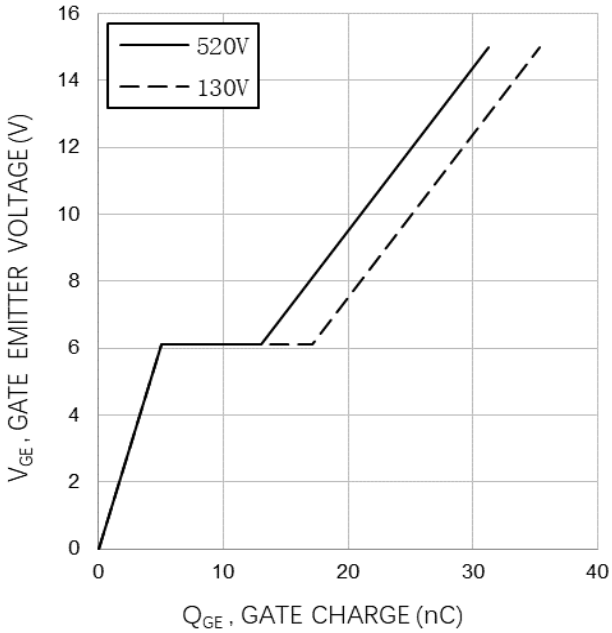


Fig. 6 Typical gate charge (I_C=60A)

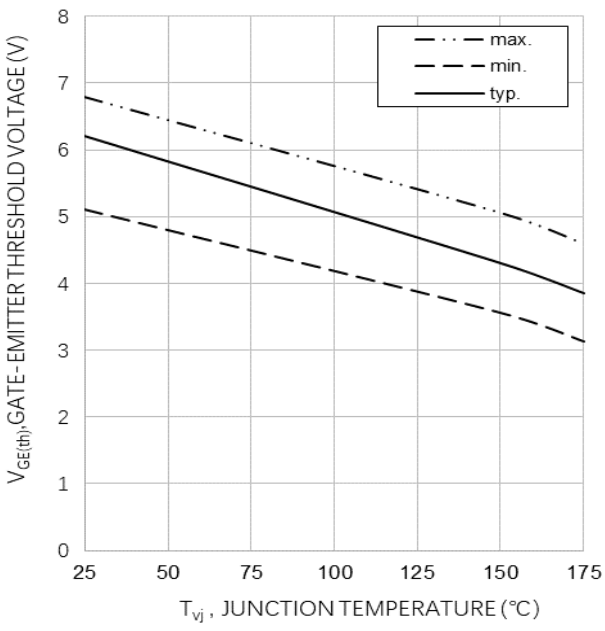


Fig. 7 Gate-emitter threshold voltage as a function of junction temperature (I_C=0.40mA)

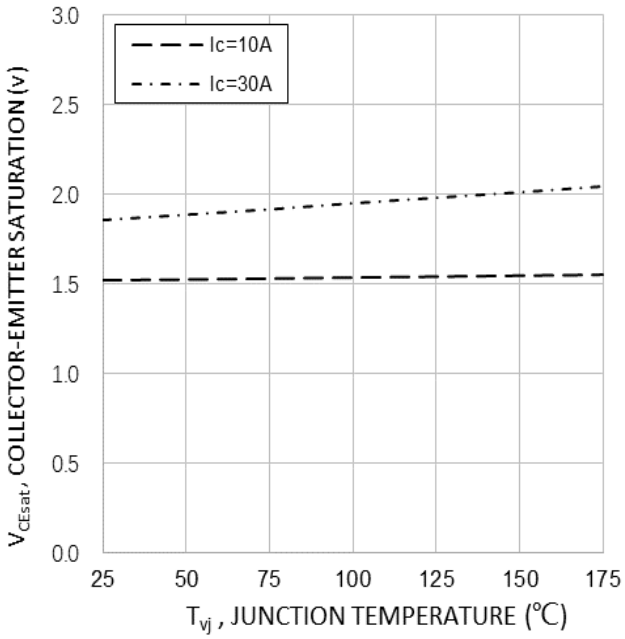


Fig. 8 Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)

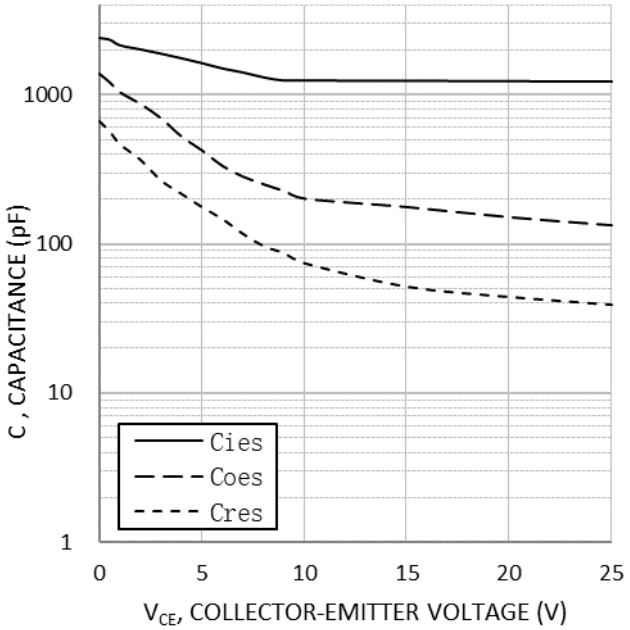
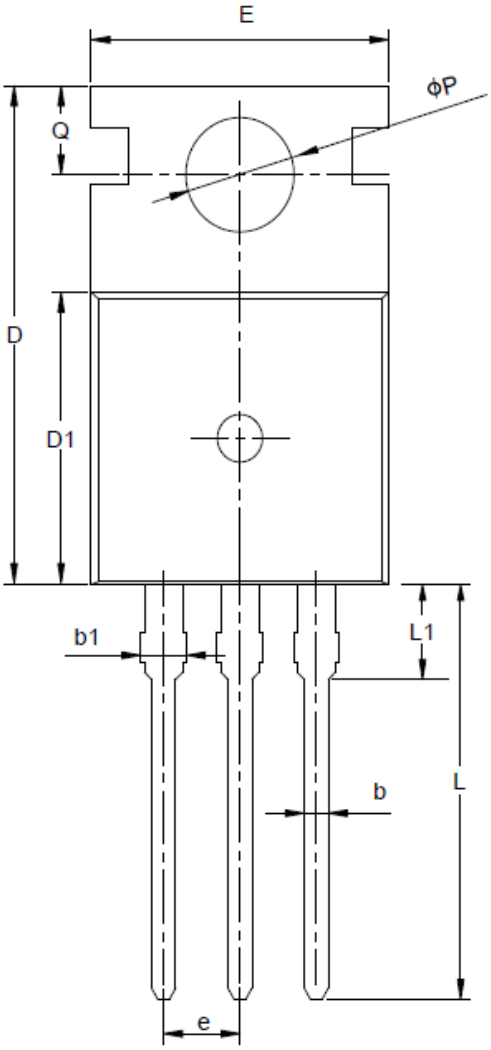
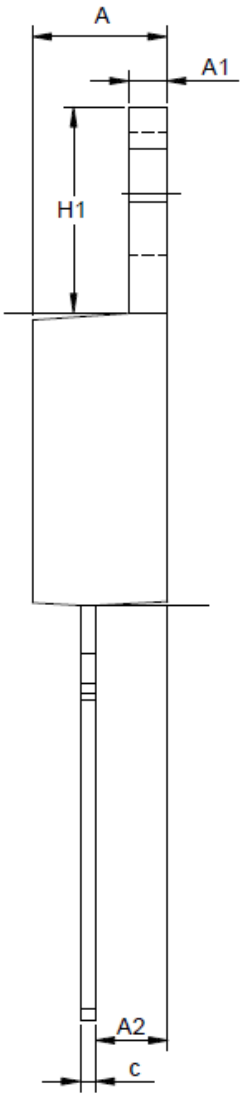


Fig. 9 Typical capacitance as a function of collector-emitter voltage (V_{GE}=0V, f=1MHz)

Package Information

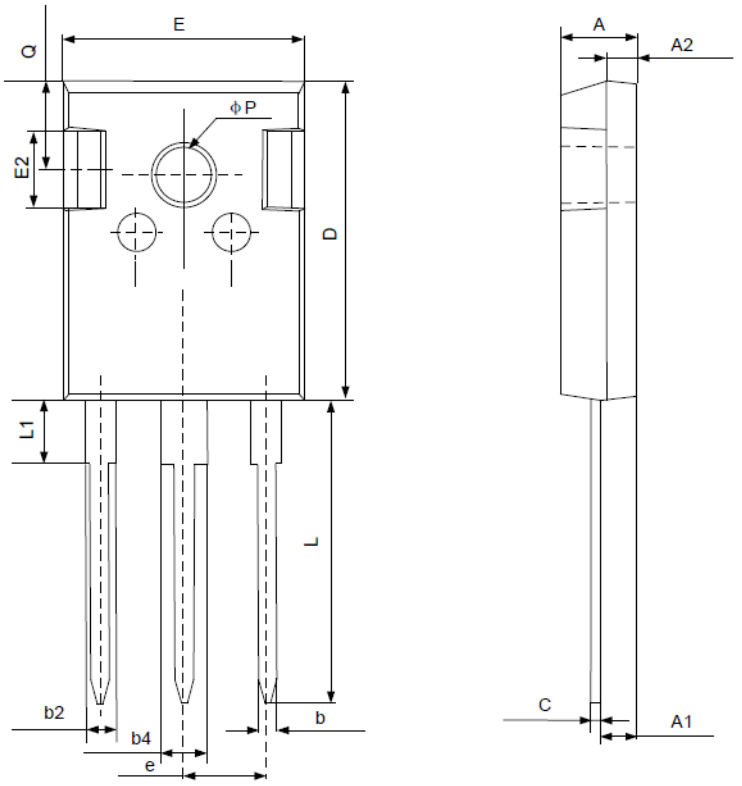
TO-220





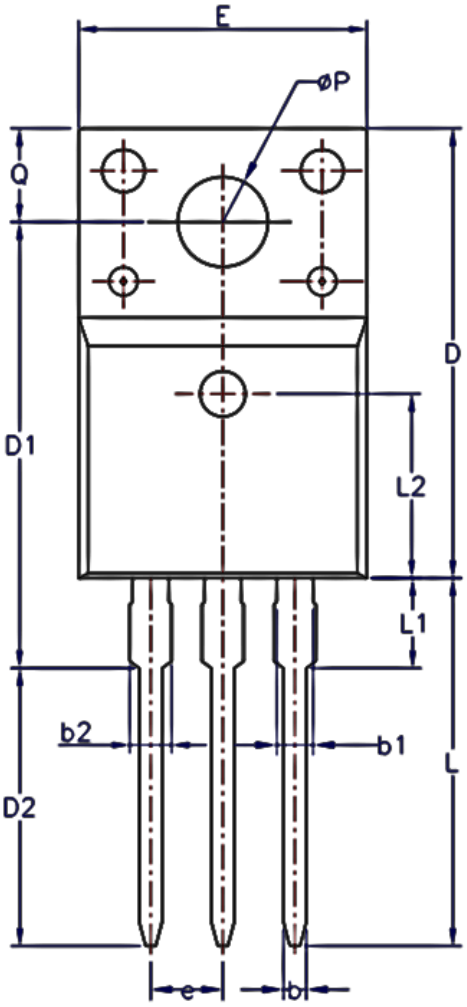
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	1.00	1.30	1.50
A2	1.80	2.40	2.80
b	0.60	0.80	1.00
b1	1.00	—	1.60
c	0.30	—	0.70
D	15.10	15.70	16.10
D1	8.10	9.20	10.00
E	9.60	9.90	10.40
e	2.54BSC		
H1	6.10	6.50	7.00
L	12.60	13.08	13.60
L1	—	—	3.95
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20

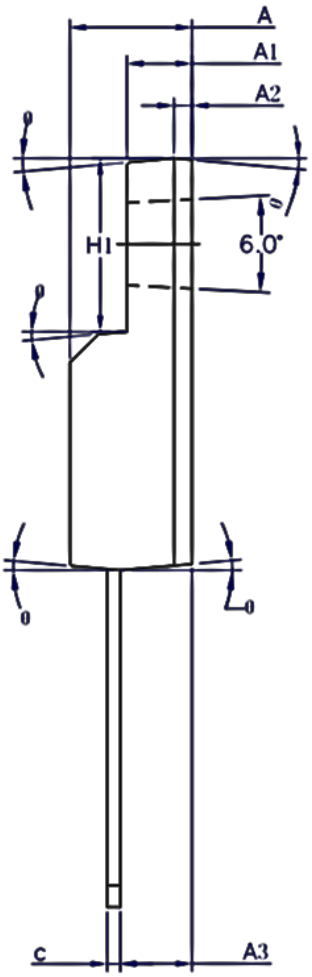
TO247

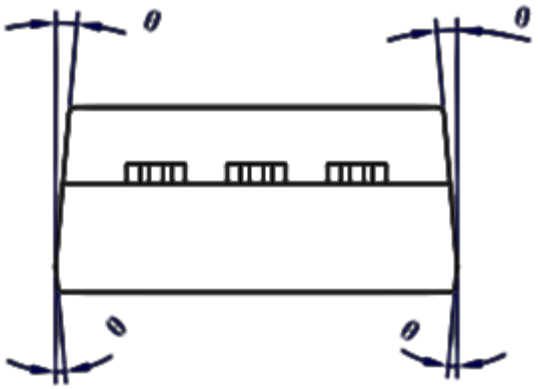


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	–	1.36
b2	1.91	–	2.25
b4	2.91	–	3.25
c	0.51	–	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	–	–	4.30
Q	5.60	5.80	6.00
P	3.40	—	3.80

TO-220F







SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2		0.70 REF	
A3	2.56	2.76	2.93
b	0.70	–	0.90
b1	1.18	–	1.38
b2	–	–	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e		2.54BSC	
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	–	–	3.50
L2		6.50REF	
øP	3.08	3.18	3.28
Q	3.20	–	3.40
θ1	1°	3°	5°