

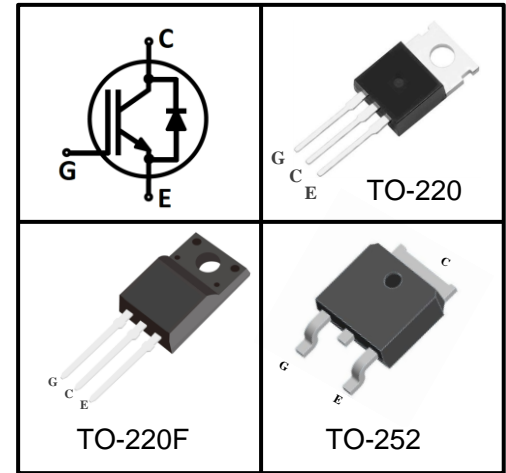
Features

- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Low V_{CEsat} , fast switching
- High ruggedness, good thermal stability
- Very tight parameter distribution

Type	Marking	Package Code
MPBP10N65EF	MP10N65EF	TO-220-3
MPBA10N65EF	MP10N65EF	TO-220F-3
MPBD10N65EF	MP10N65EF	TO-252

Applications

- Motor Drives



Maximum Rated Values ¹

Parameter	Symbol	Value			Unit
		220	220F	252	
Collector-emitter voltage	V_{CE}	650			V
DC collector current ²					A
$T_C=25^\circ\text{C}$	I_C	15			
$T_C=100^\circ\text{C}$		10			
Pulsed collector current ³	I_{Cpuls}	20			
Diode forward current ²					
$T_C=25^\circ\text{C}$	I_F	20			
$T_C=100^\circ\text{C}$		10			
Diode pulsed current ³	I_{Fpuls}	24			
Short circuit withstanding time $V_{GE} = 15\text{V}, V_{CC} \leq 400\text{V}, T_J \leq 150^\circ\text{C}$	t_{SC}	5			us
Gate-emitter voltage	V_{GE}	± 20			V
Transient Gate-emitter voltage ($t_p \leq 10\text{us}$)		± 30			
Power dissipation					W
$T_C=25^\circ\text{C}$	P_{tot}	115	32	68	
$T_C=100^\circ\text{C}$		58	16	34	
Operating junction temperature	T_J	-55~175			$^\circ\text{C}$
Storage temperature	T_{stg}	-55~150			

1:Reference standard: JESD-022 2: limited by T_{jmax} 3: T_p limited by T_{jmax} ;



Thermal Characteristics

Parameter	Symbol	Max			Unit
		220	220F	252	
IGBT thermal resistance, junction-case	R_{thJC}	1.3	4.6	2.2	K/W
Diode thermal resistance, junction-case	R_{thJCD}	2.4	5.6	2.9	
Thermal Resistance, junction-ambient	R_{thJA}	62.5	65	62.5	

Electrical Characteristics (at $T_j=25^\circ\text{C}$, unless otherwise specified) Static Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=0.25mA$	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=10A, T_j=25^\circ\text{C}$	-	1.40	1.80	
		$T_j=125^\circ\text{C}$	-	1.65	-	
		$T_j=150^\circ\text{C}$	-	1.75	-	
Diode forward voltage	V_F	$V_{GE}=0V, I_F=10A, T_j=25^\circ\text{C}$	-	1.65	1.95	
		$T_j=125^\circ\text{C}$	-	1.30	-	
		$T_j=150^\circ\text{C}$	-	1.20	-	
G-E threshold voltage	$V_{GE(th)}$	$I_C=150\mu A, V_{CE}=V_{GE}$	4.5	5.5	6.5	
C-E leakage current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_j=25^\circ\text{C}$	-	-	0.01	mA
		$T_j=150^\circ\text{C}$	-	-	1.0	
G-E leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	250	nA
Transconductance	g_{FS}	$V_{CE}=20V, I_C=10A$	-	5	-	S

Dynamic Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{iss}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1MHz$	-	1000	-	pF
Output capacitance	C_{oss}		-	45	-	
Reverse transfer capacitance	C_{rss}		-	16	-	
Gate charge	Q_G	$V_{CC}=300V, I_C=10A,$ $V_{GE}=15V$	-	58	-	nC

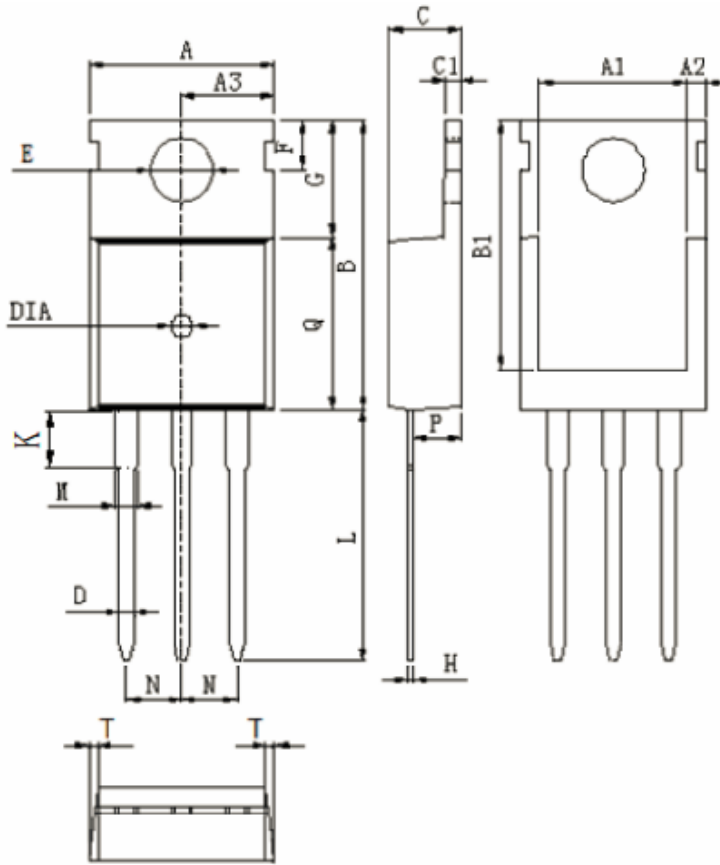
IGBT Switching Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C,$ $V_{CC}=400V,$ $I_C=10A,$ $V_{GE}=0/15V,$ $R_G=10\Omega,$ Inductive load	-	47	-	ns
Rise time	t_r		-	28	-	
Turn-off delay time	$t_{d(off)}$		-	103	-	
Fall time	t_f		-	80	-	
Turn-on energy	E_{on}		-	0.17	-	mJ
Turn-off energy	E_{off}		-	0.20	-	
Total switching energy	E_{ts}		-	0.37	-	

Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode reverse recovery time	t_{rr}	$T_j=25^\circ C,$ $V_R=400V,$ $I_F=10A,$ $di_F/dt=350A/\mu s$	-	66	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.23	-	μC
Diode peak reverse recovery current	I_{rrm}		-	5.55	-	A

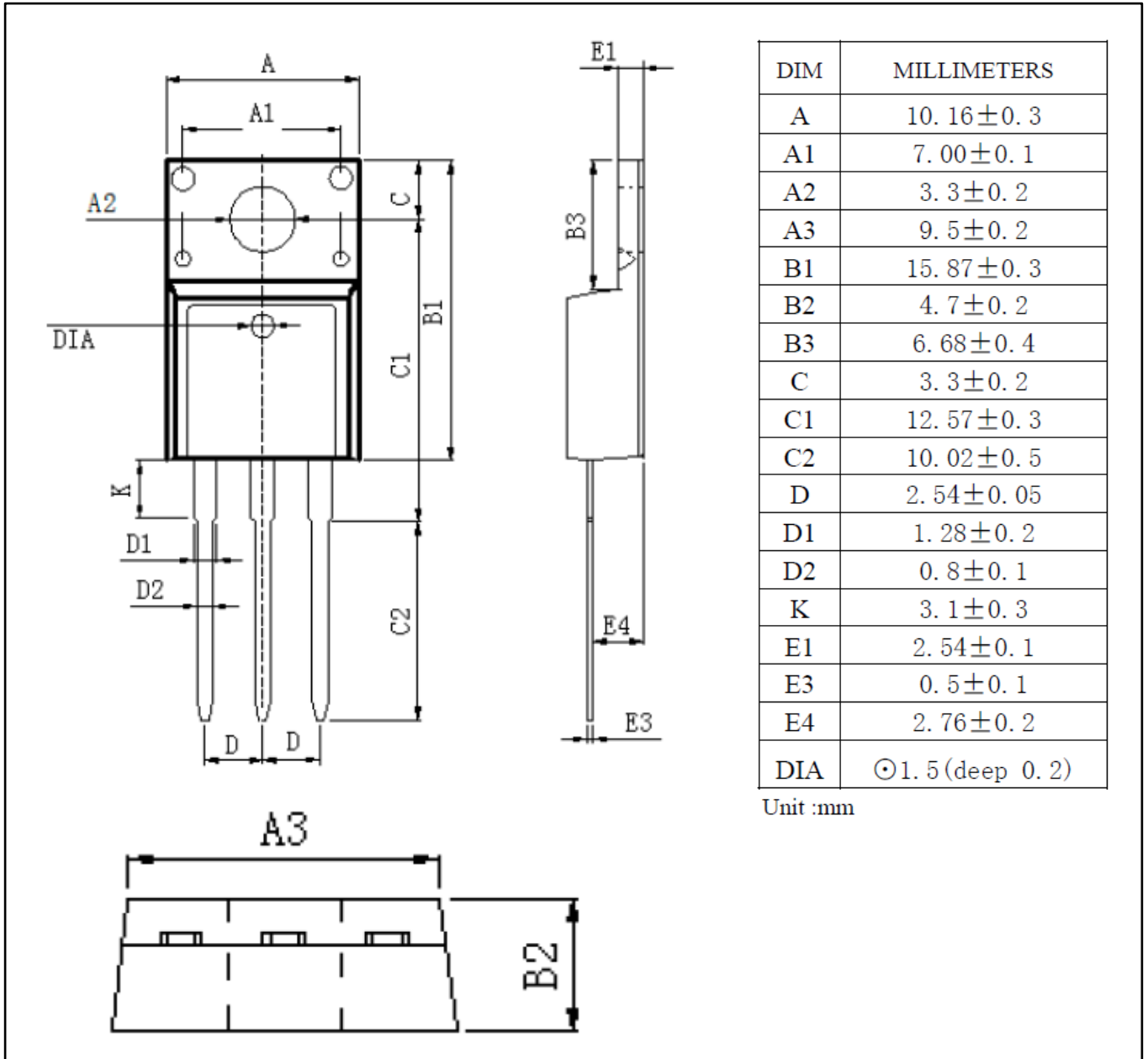
TO-220-3L



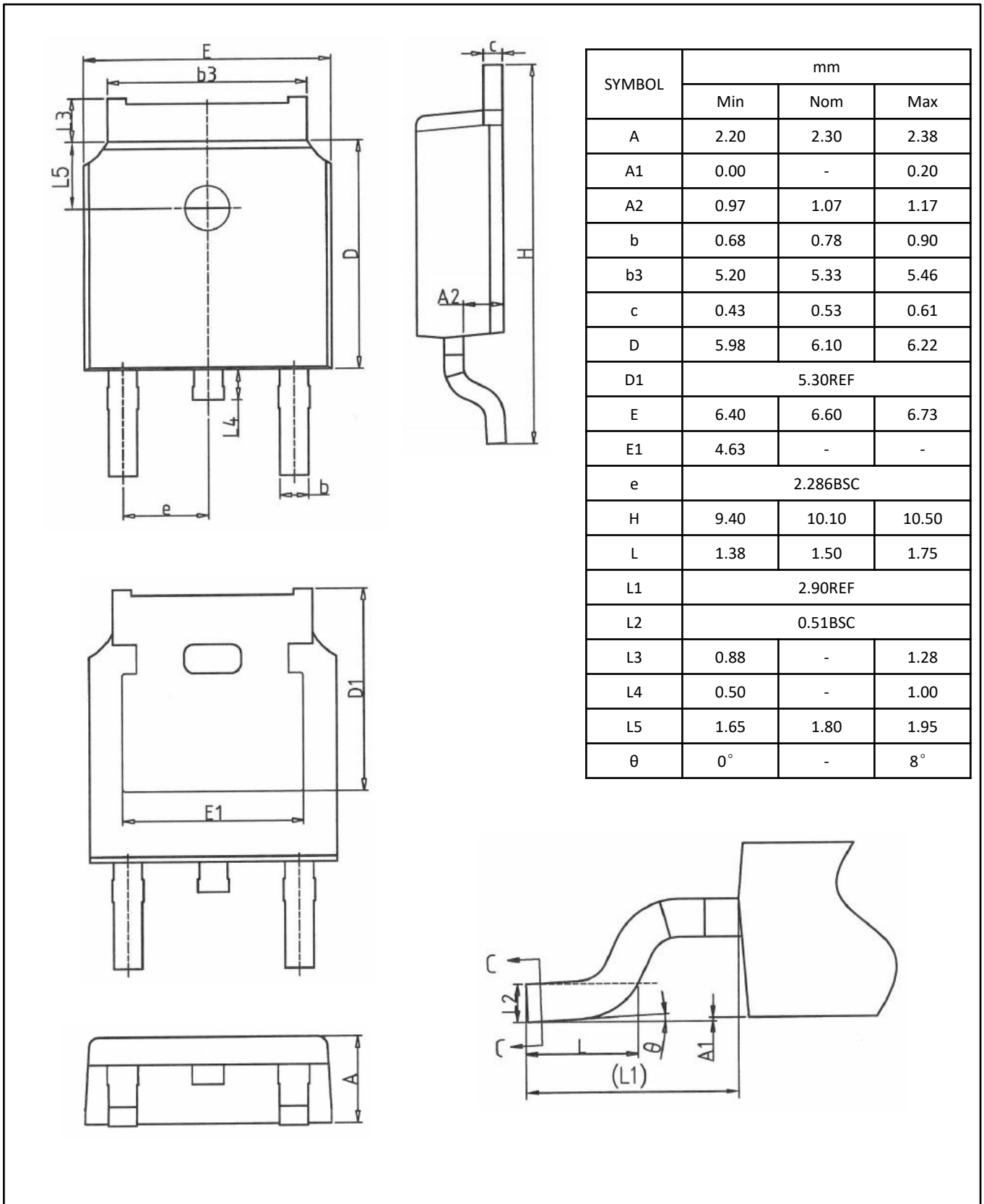
DIM	MILLIMETERS
A	10.0±0.3
A1	8.64±0.2
A2	1.15±0.1
A3	5.0±0.2
B	15.8±0.4
B1	13.2±0.3
C	4.56±0.1
C1	1.3±0.2
D	0.8±0.2
E	3.6±0.2
F	2.95±0.3
G	6.5±0.3
H	0.5±0.1
K	3.1±0.2
L	13.2±0.4
M	1.25±0.1
N	2.54±0.1
P	2.4±0.3
Q	9.0±0.3
T	W:0.35
DIA	⊙1.5 (deep 0.2)

Unit :mm

TO-220F-3L



TO-252





Revision History:

Revision	Date	Subjects (major changes since last revision)
1.0	2021-12-14	Initial version



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