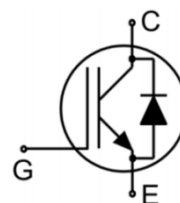


**Main Product Characteristics:**

$V_{CES}$	700V
$I_C$	40A
$V_{CE(sat)}$	1.6V


**TO - 247**

**Schematic Diagram**
**Features and Benefits:**

- Trench FS technology offering
- High speed switching
- Low gate charge and  $V_{CE(sat)}$
- High ruggedness, temperature stable behavior
- Maximum junction temperature 175°C


**Applications:**

- Solar Inverters
- Uninterruptible power supplies
- Motor drives
- Air condition

**Absolute Max Rating:**

Symbol	Parameter	Value	Units
$V_{CES}$	Collector-Emitter Voltage	700	V
$V_{GES}$	Gate- Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current	80	A
	Collector Current @ $T_C = 100\text{ }^\circ\text{C}$	40	
	Pulsed Collector Current, $t_p$ limited by $T_{Jmax}$	160	
-	Turn off safe operating area, $V_{CE}=650\text{V}$ , $T_J=175\text{ }^\circ\text{C}$	160	
$I_F$	Diode Continuous Forward Current @ $T_C = 25\text{ }^\circ\text{C}$	80	A
	Diode Continuous Forward Current @ $T_C = 100\text{ }^\circ\text{C}$	40	
	Diode Maximum Forward Current	160	
$P_D$	Power Dissipation @ $T_C = 25\text{ }^\circ\text{C}$	394	W
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	260	$^\circ\text{C}$

**Thermal Resistance**

Symbol	Characterizes	Typ.	Max.	Units
R <sub>θJC</sub>	Thermal Resistance, Junction-to-case for IGBT	—	0.38	°C/W
	Thermal Resistance, Junction-to-case for Diode	—	0.65	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-ambient	—	40	°C/W

**Electrical Characteristics @T<sub>A</sub>=25°C unless otherwise specified**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)CES</sub>	Collector-Emitter Breakdown Voltage	700	—	—	V	V <sub>GE</sub> =0V, I <sub>CE</sub> =1mA
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	—	1.6	1.85	V	I <sub>C</sub> =40A, V <sub>GE</sub> =15V @ T <sub>J</sub> =25°C
V <sub>GE(th)</sub>	Gate Threshold Voltage	4	—	6	V	I <sub>C</sub> =250μA, V <sub>CE</sub> =V <sub>GE</sub>
I <sub>CES</sub>	Collector-Emitter Leakage Current	—	—	1	μA	V <sub>GE</sub> =0V, V <sub>CE</sub> =700V
I <sub>GES</sub>	Gate to Emitter Reverse Leakage	—	—	100	nA	V <sub>GE</sub> =25V, V <sub>CE</sub> =0V
		—	—	-100		V <sub>GE</sub> =-25V, V <sub>CE</sub> =0V
C <sub>ies</sub>	Input capacitance	—	2756	—	pF	V <sub>GS</sub> = 0V
C <sub>oes</sub>	Output capacitance	—	123	—		V <sub>DS</sub> = 25V
C <sub>res</sub>	Reverse transfer capacitance	—	70	—		f = 1MHz
t <sub>d(on)</sub>	Turn-on delay time	—	28	—	ns	V <sub>CC</sub> =400V, I <sub>C</sub> =40A, V <sub>GE</sub> =0/15V, R <sub>g</sub> =10Ω,
t <sub>r</sub>	Rise time	—	41	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	152	—		
t <sub>f</sub>	Fall time	—	63	—		
E <sub>on</sub>	Turn-On Switching Loss	—	0.9	—	mJ	V <sub>CC</sub> =400V, I <sub>C</sub> =40A, V <sub>GE</sub> =0/15V, R <sub>g</sub> =10Ω,
E <sub>off</sub>	Turn-Off Switching Loss	—	0.6	—		
E <sub>ts</sub>	Total Switching Loss	—	1.7	—		
Q <sub>g</sub>	Total Gate Charge	—	155	—	nC	V <sub>CC</sub> =480V, I <sub>C</sub> =40A, V <sub>GE</sub> =15V
Q <sub>ge</sub>	Gate to Emitter Charge	—	34	—		
Q <sub>gc</sub>	Gate to Collector Charge	—	63	—		
I <sub>C(SC)</sub>	Short circuit collector current	—	340	—	A	V <sub>GE</sub> =15V, V <sub>CC</sub> ≤400V, t <sub>sc</sub> ≤5μs
	Max.1000 short circuits Time between short circuits: ≥1.0s					

**Electrical Characteristics of the Diode @T<sub>A</sub>=25°C unless otherwise specified**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>FM</sub>	Diode Forward Voltage	—	1.7	2.4	V	I <sub>F</sub> =40A
t <sub>rr</sub>	Reverse Recovery Time	—	65	—	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> =40A, di/dt = 200A/μs
Q <sub>rr</sub>	Reverse Recovery Charge	—	0.73	—	μC	
I <sub>RRM</sub>	Diode Peak Reverse Recovery Current	—	21.2	—	A	

Typical Electrical and Thermal Characteristics

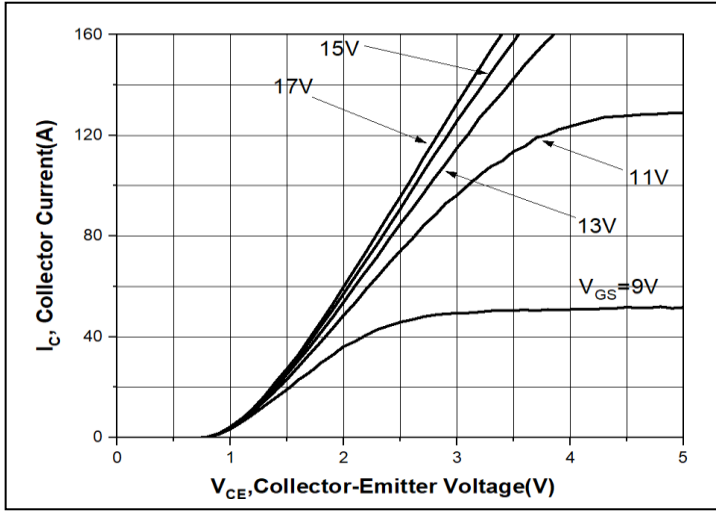


Figure1. Typical Output Characteristics

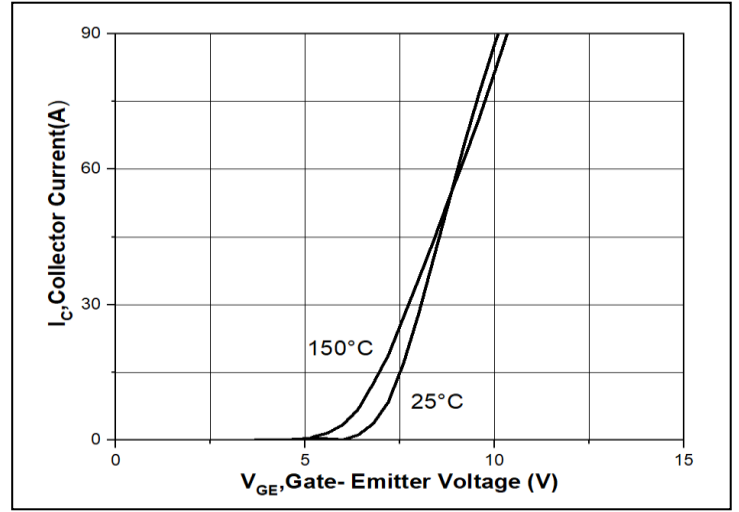


Figure2. Typical Transfer Characteristics

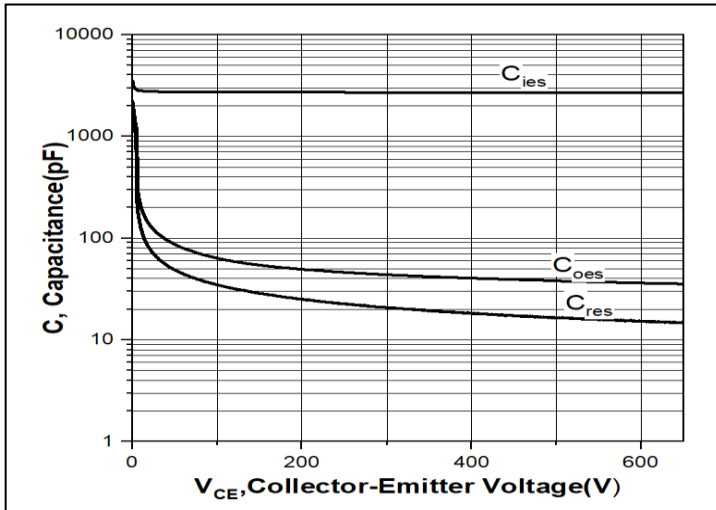


Figure3. Typical Capacitance

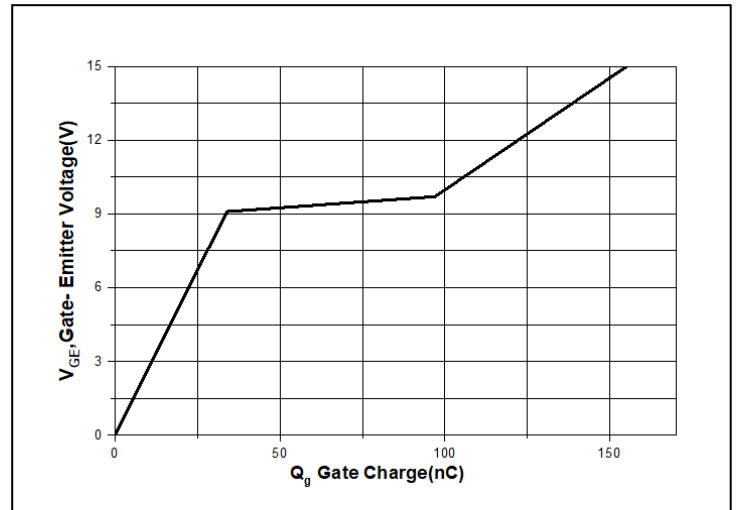


Figure4. Typical Gate Charge

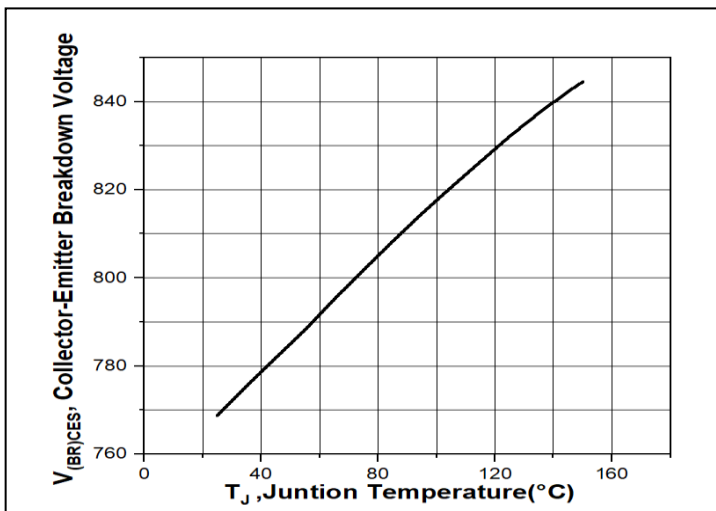


Figure5. Collector-Emitter Breakdown Voltage vs. Temperature

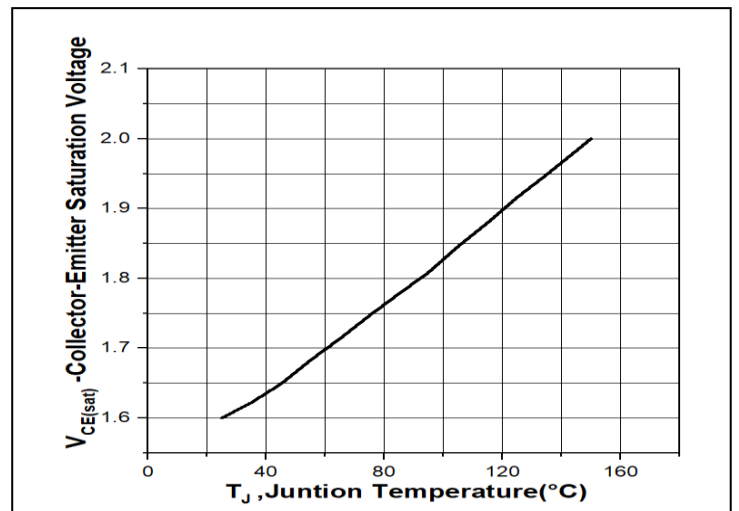


Figure6. Collector-Emitter Saturation Voltage vs. Temperature

Typical Electrical and Thermal Characteristics

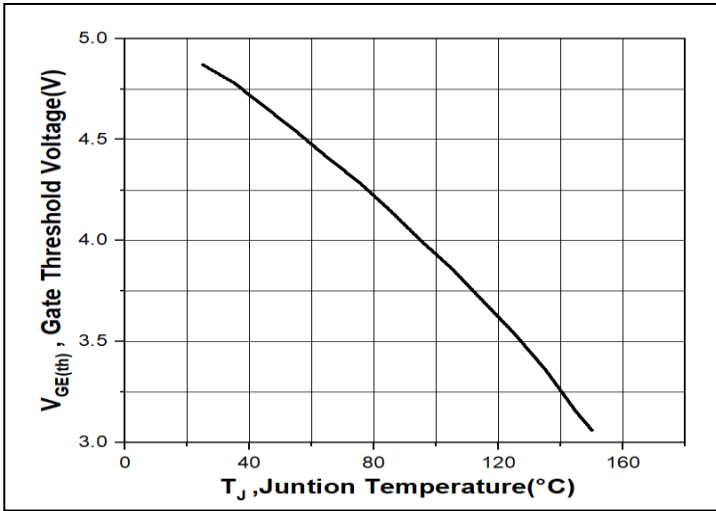


Figure7. Gate Threshold Voltage vs. Temperature

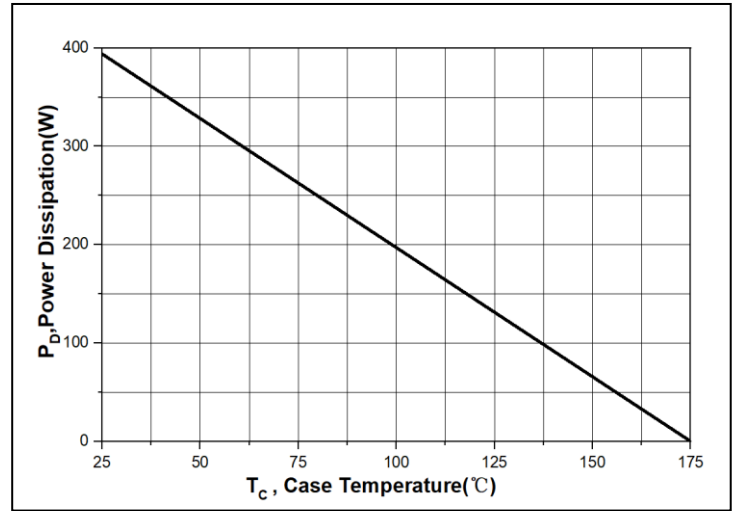


Figure8. Power Dissipation vs. Case Temperature

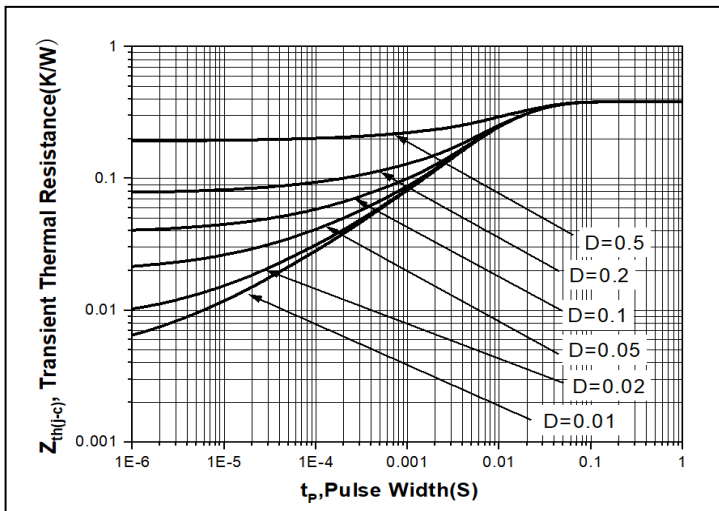


Figure9. IGBT transient thermal resistance ( $D = t_p/T$ )

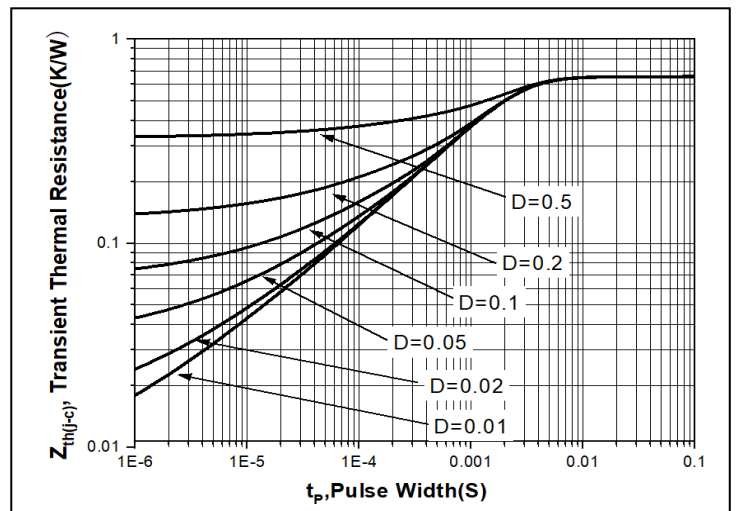
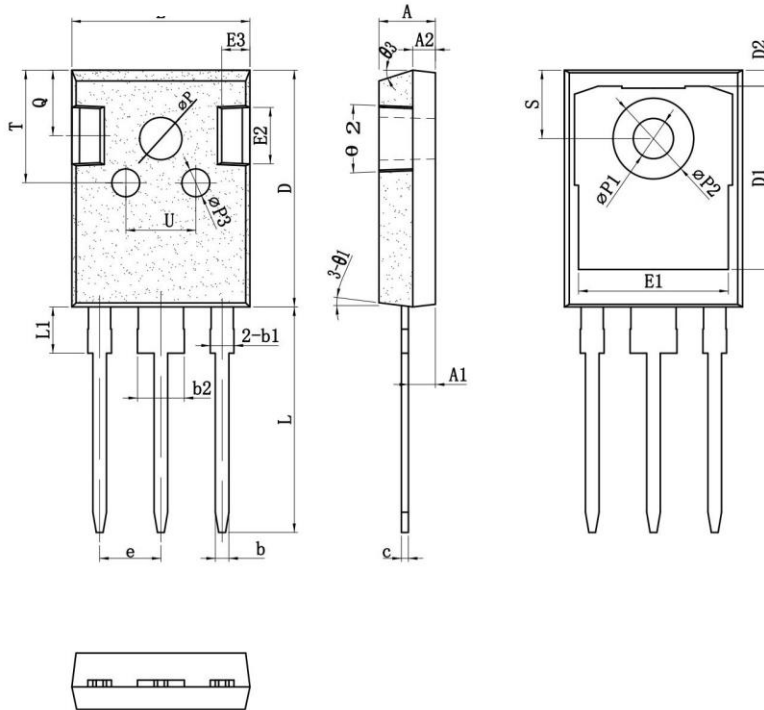
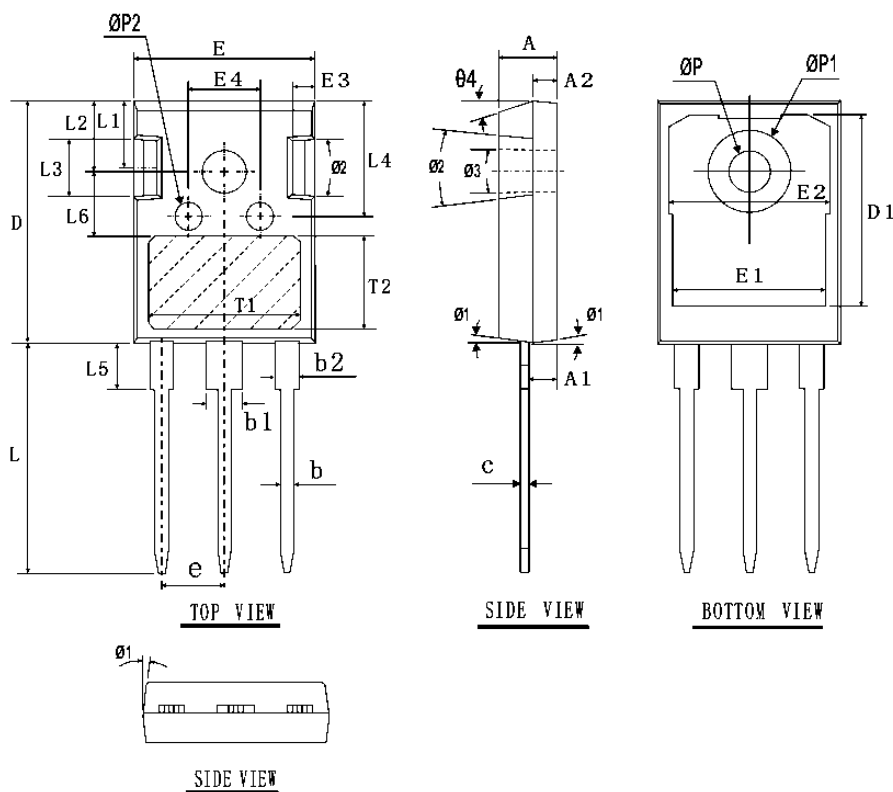


Figure10. Diode transient thermal impedance as a function of pulse width ( $D = t_p/T$ )

**Mechanical Data:**
**Option1:**
**Unit:mm**


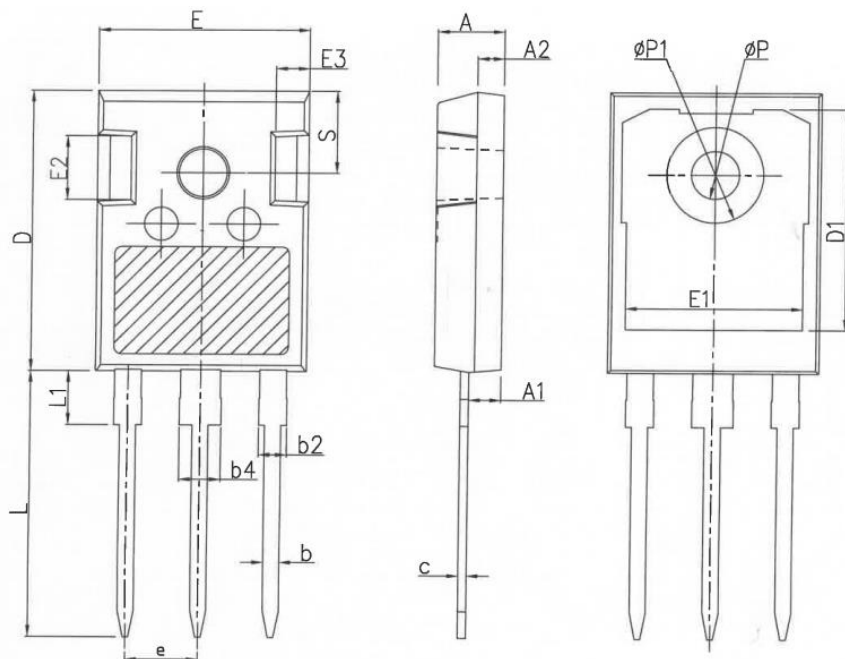
SYMBOL	mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
*E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.98	20.15
*L1	-	-	4.30
*ΦP	3.60	3.70	3.80
*ΦP1	3.45	3.55	3.65
ΦP2	7.03	7.18	7.33
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°

Option2:



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.20	2.40	2.60
A2	1.85	2.00	2.15
b	1.10	1.20	1.30
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
C	0.52	0.62	0.72
D	20.35	20.65	20.95
D1	16.35	16.55	16.75
E	15.50	15.80	16.10
E1	13.10	13.30	13.50
E2	13.80	14.00	14.20
E3	1.45	1.60	1.75
E4	6.00	6.20	6.40
L	19.80	20.00	20.20
L1	5.88	5.98	6.08
L2	5.88	5.98	6.08
L3	4.90	5.00	5.10
L4	9.70	9.80	9.90
L5	4.10	4.30	4.50
Ø1	4°	7°	10°
Ø2	11°	14°	17°
Ø3	1°	---	2°
Ø4	10°	15°	20°
ØP	3.35	3.60	3.85
ØP1	---	---	7.30
ØP2	2.25	2.50	2.75
e	5.44BSC		
T1	12.80REF		
T2	7.80REF		
L6	5.50REF		

**Option3:**


SYMBOL	COMMON DIMENSIONS		
	mm		
	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	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

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