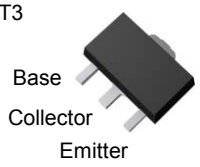
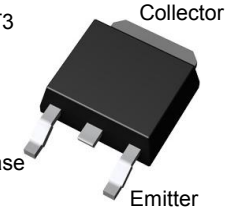
2SAR542P / 2SAR542D

PNP -5.0A -30V Middle Power Transistor

Datasheet

Parameter	Value
V_{CEO}	−30V
I_C	−5.0A

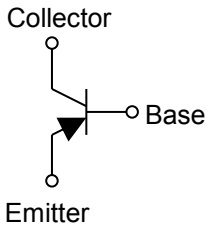
●Outline

MPT3	CPT3
	
2SAR542P (SC-62) <SOT-89>	2SAR542D (SC-63) <SOT-428>

●Features

1) Suitable for Middle Power Driver
2) Complementary NPN Types : 2SCR542P / 2SCR542D
3) Low $V_{CE(sat)}$
   $V_{CE(sat)}$= −0.4V Max. (I_C/I_B= −2A/ −100mA)
4) Lead Free/RoHS Compliant.

●Inner circuit



●Applications

Motor driver , LED driver
Power supply

●Packaging specifications

Part No.	Package	Package size (mm)	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit (pcs)	Marking
2SAR542P	MPT3	4540	T100	180	12	1,000	MQ
2SAR542D	CPT3	6595	TL	330	16	2,500	AR542

●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Values	Unit
Collector-base voltage		V_{CBO}	−30	V
Collector-emitter voltage		V_{CEO}	−30	V
Emitter-base voltage		V_{EBO}	−6	V
Collector current	DC	I_C	−5.0	A
	Pulsed	I_{CP} *1	−10	A
Power dissipation	2SAR533P	P_D	0.5 *2	W
			2.0 *3	W
	2SAR533D		1.0 *4	W
			10 *5	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	−55 to +150	°C

*1 Pw=10ms , single pulse *2 Each terminal mounted on a reference land
*3 Mounted on a ceramic board (40×40×0.7mm) *4 Mounted on a substrate *5 T_C=25°C

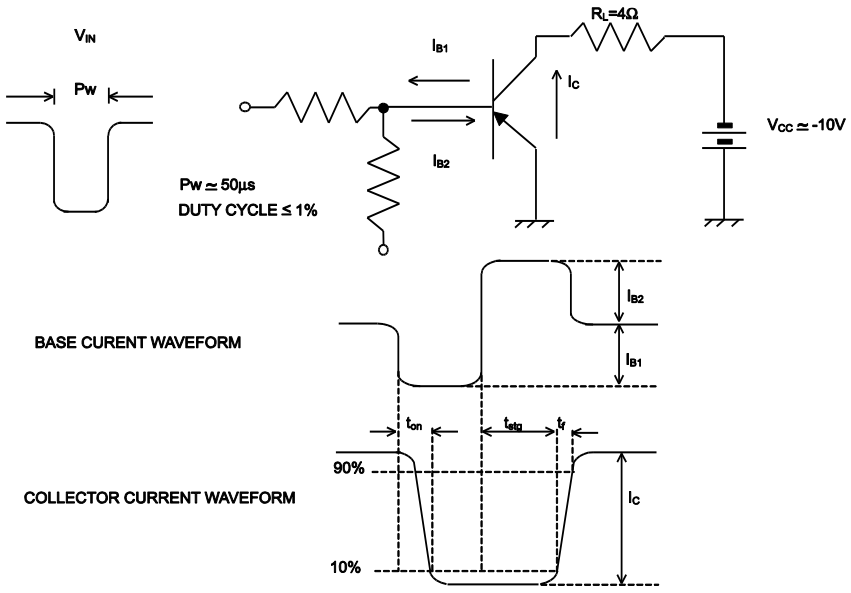
●Electrical characteristics(Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	BV_{CEO}	I_C = −1mA	−30	-	-	V
Collector-base breakdown voltage	BV_{CBO}	I_C = −100μA	−30	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	I_E = −100μA	−6	-	-	V
Collector cut-off current	I_{CBO}	V_{CB} = −30V	-	-	−1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = −4V	-	-	−1	μA
Collector-emitter saturation voltage	$V_{CE(sat)}$ *1	I_C = −2A, I_B = −100mA	-	−0.20	−0.40	V
DC current gain	h_{FE}	V_{CE} = −2V, I_C = −500mA	200	-	500	-
Transition frequency	f_T	V_{CE} = −10V, I_E = 100mA f=100MHz	-	240	-	MHz
Output capacitance	C_{ob}	V_{CB} = −10V, I_E = 0A, f = 1MHz	-	40	-	pF
Turn-on time	t_{on} *2	I_C= −2.5A I_{B1}= −250mA I_{B2}=250mA $V_{CC}\simeq$ −10V	-	45	-	ns
Storage time	t_{stg} *2		-	200	-	ns
Fall time	t_f *2		-	25	-	ns

*1 Pulsed

*2 See switching time test circuit

●Switching time test circuit



●**Electrical characteristic curves**(Ta = 25°C)

Fig.1 Ground Emitter Propagation Characteristics

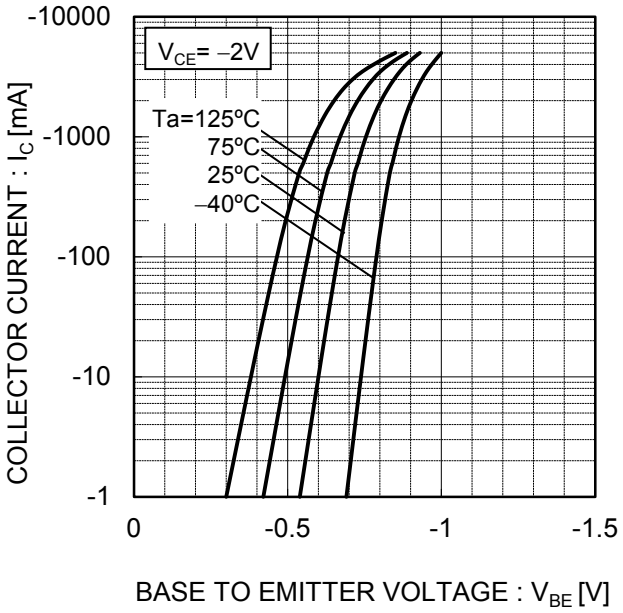


Fig.2 Typical Output Characteristics

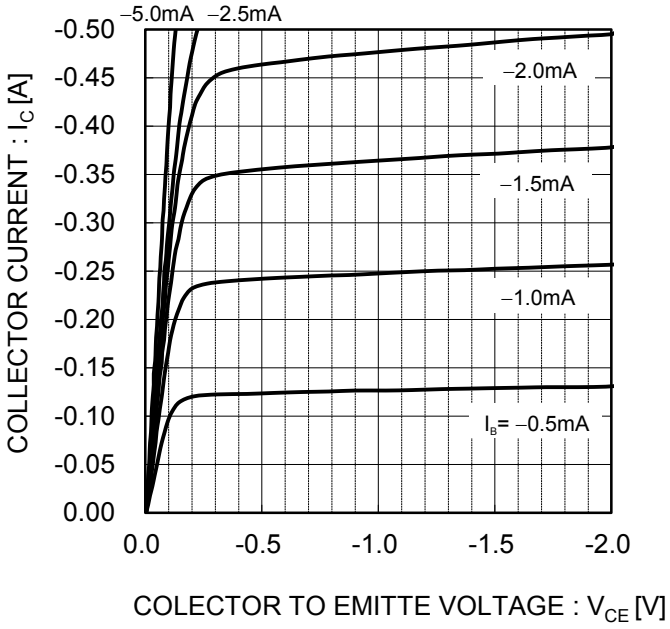


Fig.3 DC Current Gain vs. Collector Current(I)

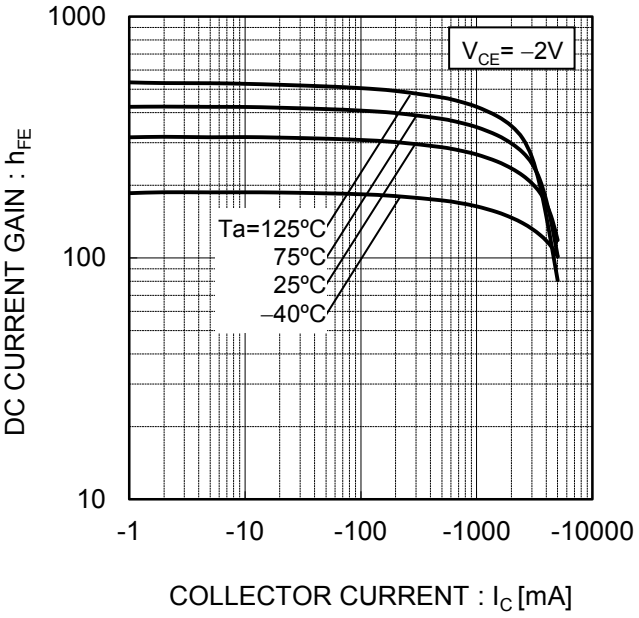
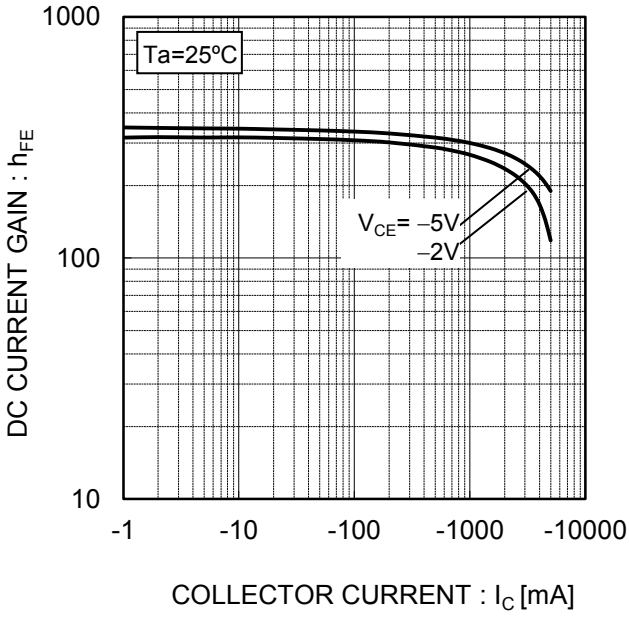


Fig.4 DC current gain vs. output current (II)



●**Electrical characteristic curves**(Ta = 25°C)

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (I)

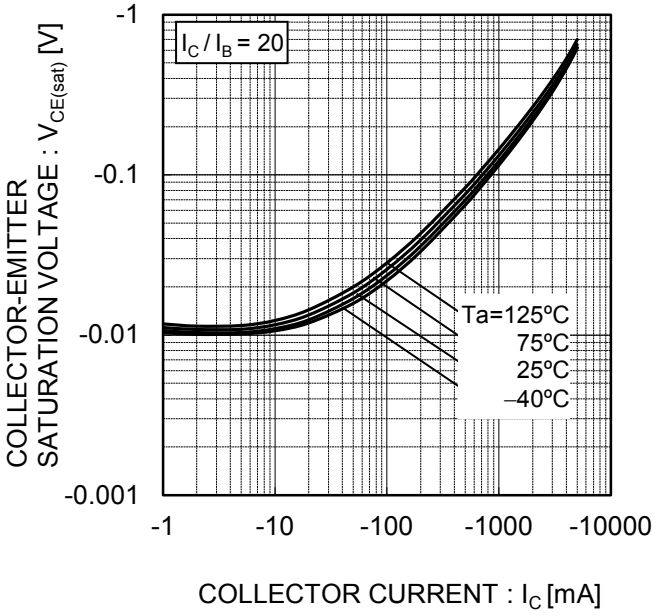


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

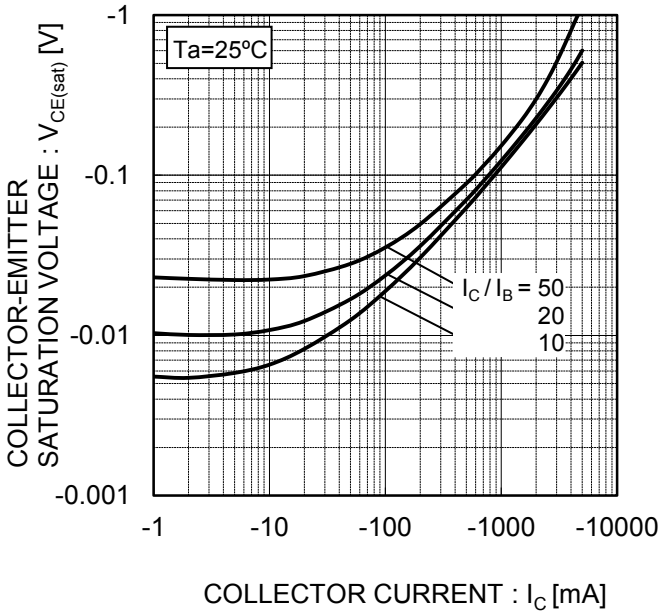


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

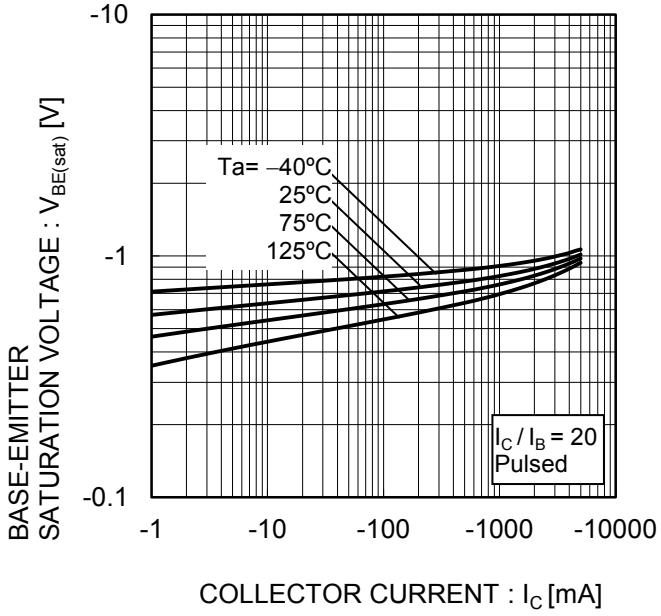
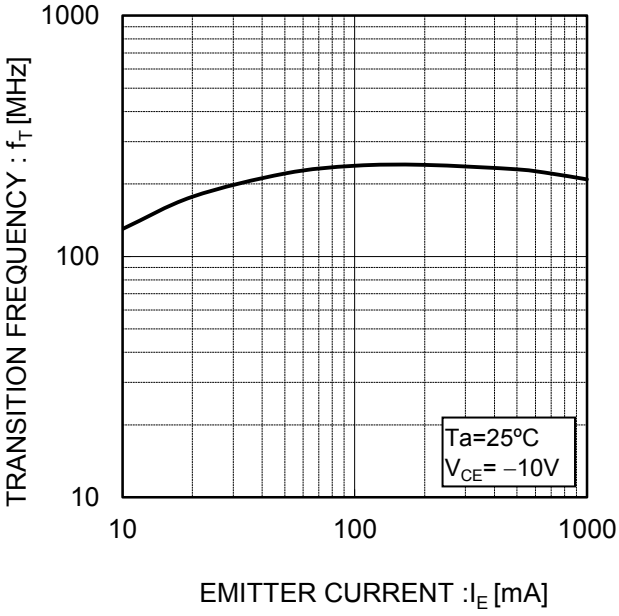


Fig.8 Gain Bandwidth Product vs. Emitter Current



●**Electrical characteristic curves**(Ta = 25°C)

Fig.9 Emitter input capacitance vs. Emitter-Base Voltage
Collector output capacitance vs. Collector-Base Voltage

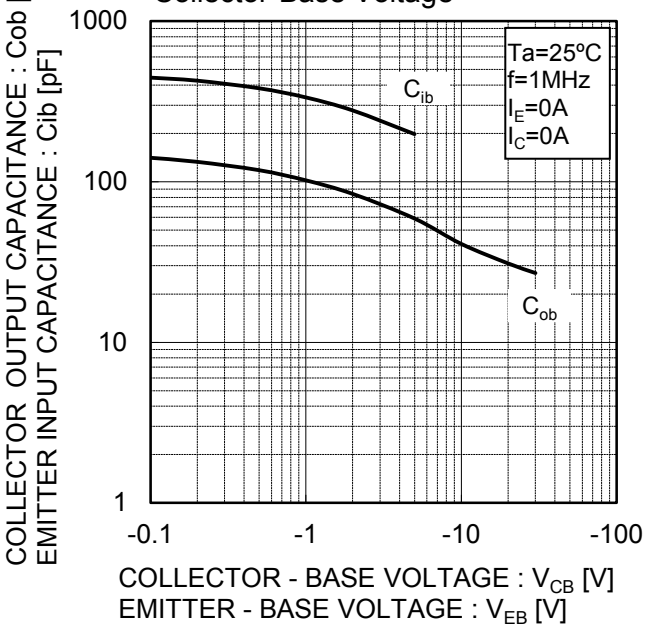


Fig.10 Safe Operating Area

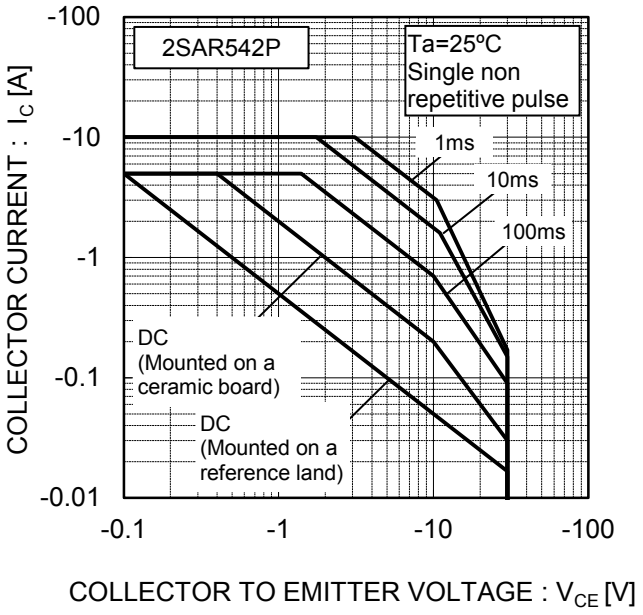
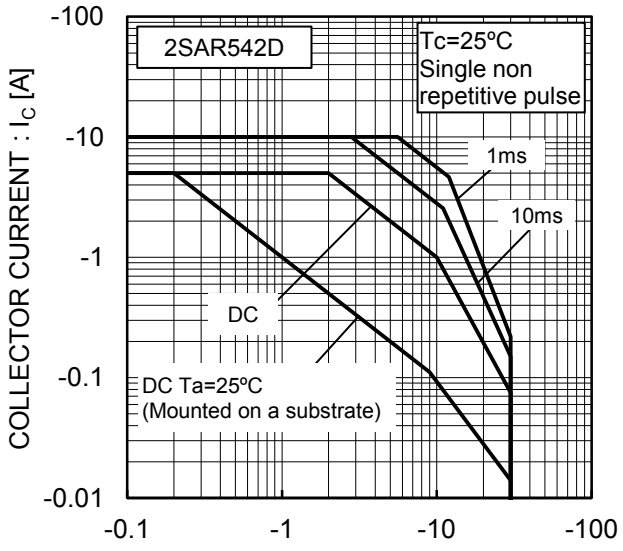
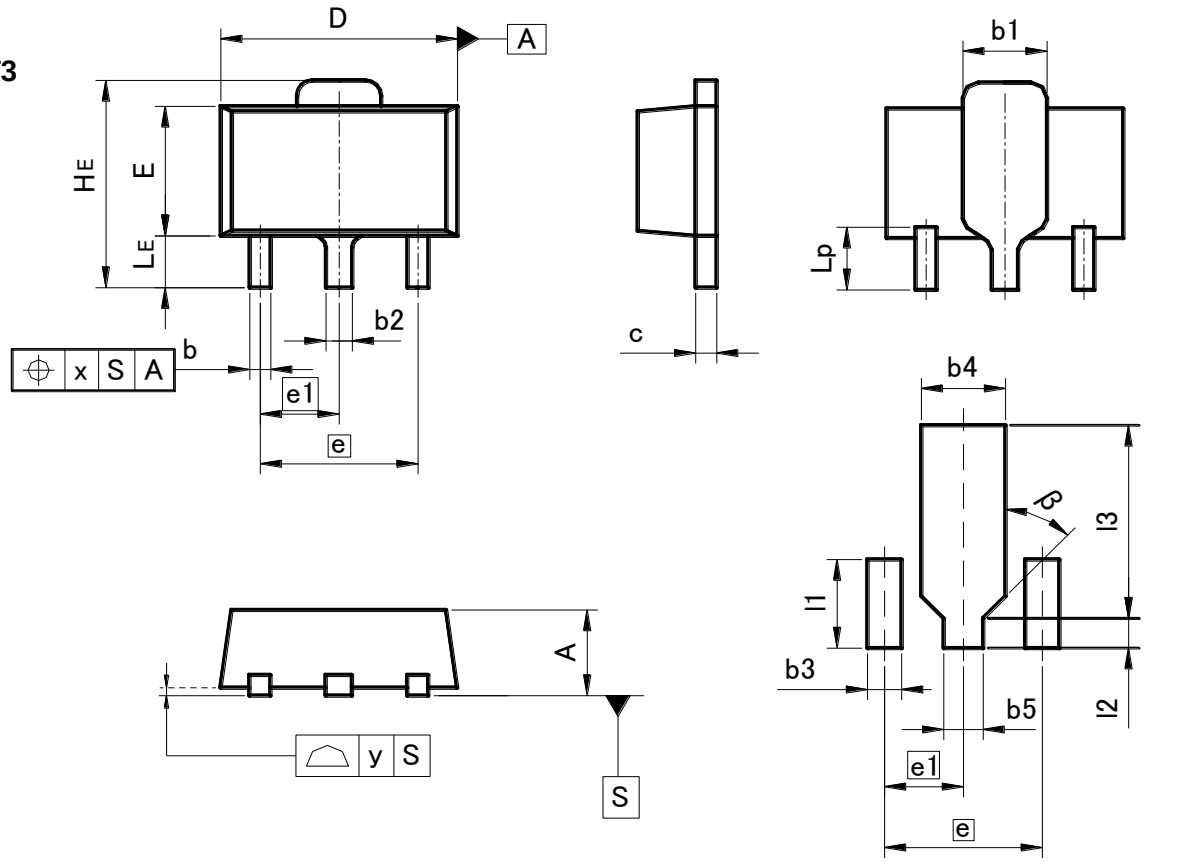


Fig.11 Safe Operating Area



●**Dimensions** (Unit : mm)

MPT3



Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

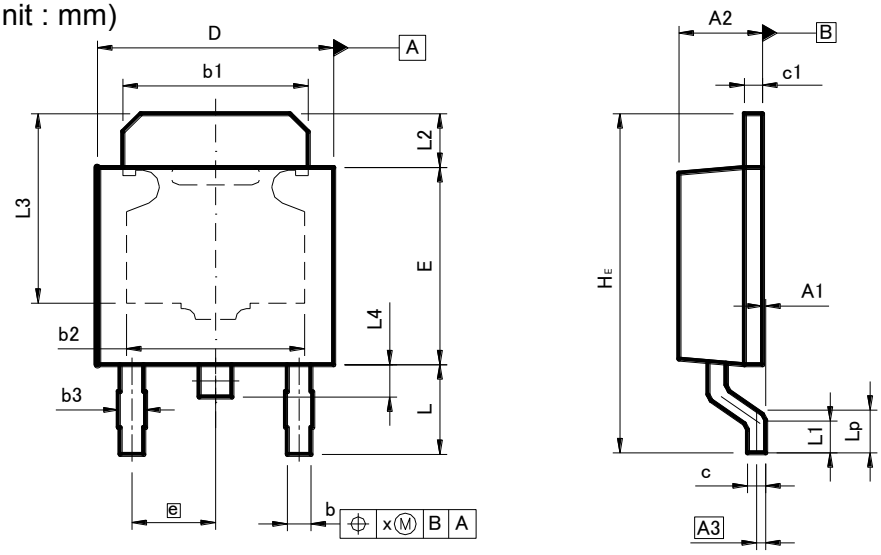
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.40	1.50	0.055	0.059
b	0.30	0.50	0.012	0.020
b1	1.50	1.70	0.059	0.067
b2	0.40	0.60	0.016	0.024
c	0.35	0.50	0.014	0.020
D	4.40	4.70	0.173	0.185
E	2.40	2.70	0.094	0.106
e	3.00		0.118	
e1	1.50		0.059	
HE	3.70	4.30	0.146	0.169
LE	0.80	1.20	0.031	0.047
Lp	1.01	1.41	0.040	0.056
x	–	0.15	–	0.006
y	–	0.10	–	0.004

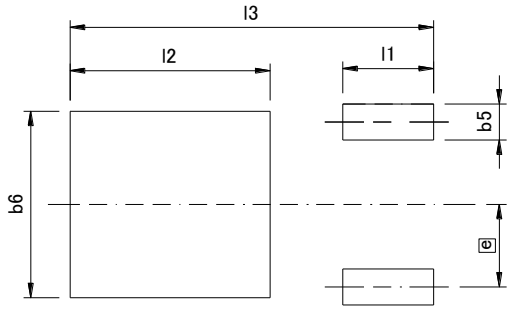
DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b3	–	0.65	–	0.026
b4	–	1.70	–	0.067
b5	–	0.75	–	0.030
l1	–	1.71	–	0.067
l2	–	0.58	–	0.023
l3	–	3.72	–	0.146
β	45°		45°	

Dimension in mm / inches

●**Dimensions** (Unit : mm)

CPT3





Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	0.00	0.15	0.000	0.006
A2	2.20	2.50	0.087	0.098
A3	0.25		0.010	
b	0.55	0.75	0.022	0.030
b1	5.00	5.30	0.197	0.209
b2	5.00		0.197	
b3	0.75		0.030	
c	0.40	0.60	0.016	0.024
c1	0.40	0.60	0.016	0.024
D	6.30	6.70	0.248	0.264
E	5.40	5.80	0.213	0.228
e	2.30		0.091	
HE	9.00	10.00	0.354	0.394
L	2.20	2.80	0.087	0.110
L1	0.80	1.40	0.031	0.055
L2	1.20	1.80	0.047	0.071
L3	5.30		0.209	
L4	0.90		0.035	
Lp	1.00	1.60	0.039	0.063
x	–	0.25	–	0.010

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b5	–	1.00	–	0.04
b6	–	5.20	–	0.205
l1	–	2.50	–	0.098
l2	–	5.50	–	0.217
l3	–	10.00	–	0.394

Dimension in mm / inches

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