

Parameter	Value
V_{CEO}	-50V
I_C	-150mA







●Features

- 1) General Purpose.
- 2) Complementary: 2SC5658/2SC4617EB / 2SC4617/2SC4081UB/2SC4081/2SC2412K
- 3) Lead Free/RoHS Compliant.

●Application

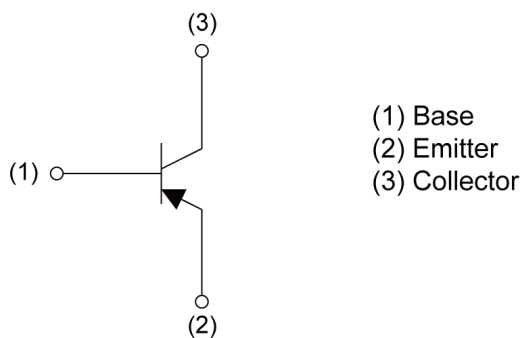
Switching circuit, LED driver circuit

●Outline

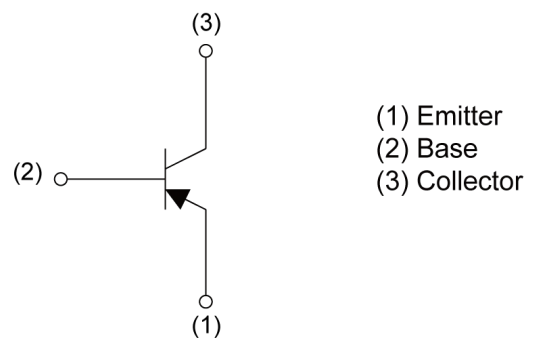
<p>SOT-723</p>  <p>2SA2029 (VMT3)</p>	<p>SOT-416FL</p>  <p>2SA1774EB (EMT3F)</p>
<p>SOT-416</p>  <p>2SA1774 (EMT3)</p>	<p>SOT-323FL</p>  <p>2SA1576UB (UMT3F)</p>
<p>SOT-323</p>  <p>2SA1576A (UMT3)</p>	<p>SOT-346</p>  <p>2SA1037AK (SMT3)</p>

●Inner circuit

2SA2029/2SA1774EB/2SA1576UB



2SA1774/2SA1576A/2SA1037AK



●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	hFE rank	Marking
2SA2029	SOT-723	1212	T2L	180	8	8000	QRS	F
2SA1774EB	SOT-416FL	1616	TL	180	8	3000	QRS	F
2SA1774	SOT-416	1616	TL	180	8	3000	QRS	F
2SA1576UB	SOT-323FL	2021	TL	180	8	3000	QRS	F
2SA1576A	SOT-323	2021	T106	180	8	3000	QRS	F
2SA1037AK	SOT-346	2928	T146	180	8	3000	QRS	F

● Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Values	Unit
Collector-base voltage		V _{CBO}	-60	V
Collector-emitter voltage		V _{CEO}	-50	V
Emitter-base voltage		V _{EBO}	-6	V
Collector current		I _C	-150	mA
		I _{CP} *1	-200	mA
Power dissipation	2SA2029	P _D *2	150	mW
	2SA1774EB		150	
	2SA1774		150	
	2SA1576UB		200	
	2SA1576A		200	
	2SA1037AK		200	
Junction temperature		T _j	150	°C
Range of storage temperature		T _{stg}	-55 to +150	°C

● Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	BV _{CBO}	I _C = -50μA	-60	-	-	V
Collector-emitter breakdown voltage	BV _{CEO}	I _C = -1mA	-50	-	-	V
Emitter-base breakdown voltage	BV _{EBO}	I _E = -50μA	-6	-	-	V
Collector cut-off current	I _{CBO}	V _{CB} = -60V	-	-	-100	nA
Emitter cut-off current	I _{EBO}	V _{EB} = -6V	-	-	-100	nA
Collector-emitter saturation voltage	V _{CE(sat)}	I _C = -50mA, I _B = -5mA	-	-	-500	mV
DC current gain	h _{FE}	V _{CE} = -6V, I _C = -1mA	120	-	560	-
Transition frequency	f _T	V _{CE} = -12V, I _E = 2mA, f = 100MHz	-	140	-	MHz
Output capacitance	C _{ob}	V _{CB} = -12V, I _E = 0A, f = 1MHz	-	4.0	5.0	pF

hFE values are classified as follows :

rank	Q	R	S	-	-
h _{FE}	120-270	180-390	270-560	-	-

*1 Pw=1ms Single Pulse

*2 Each terminal mounted on a reference footprint

● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.1 Ground Emitter Propagation Characteristics



Fig.2 Typical Output Characteristics

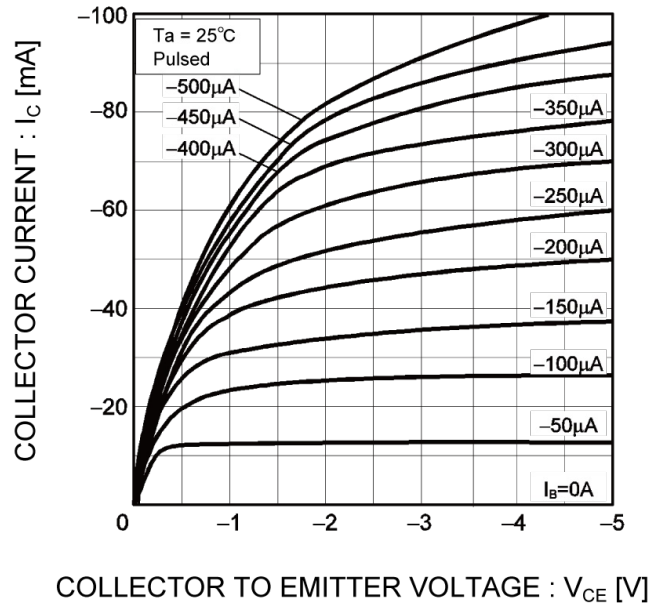
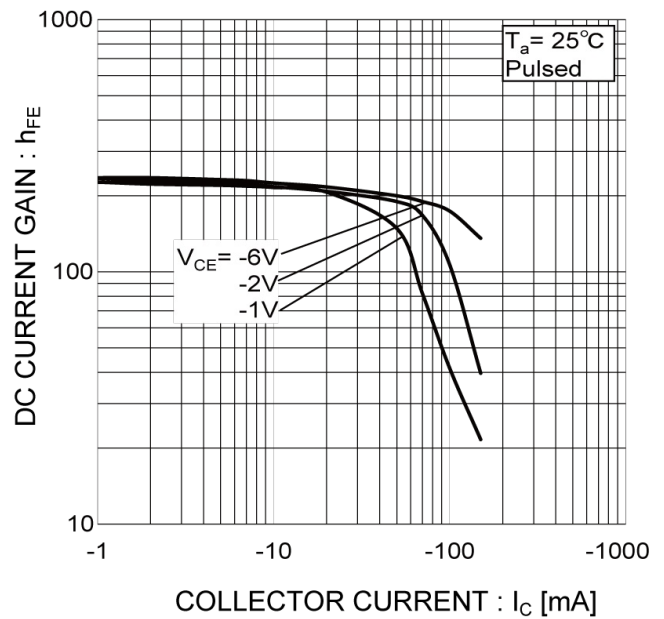


Fig.3 DC Current Gain vs. Collector Current (I)



Fig.4 DC Current Gain vs. Collector Current (II)



● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

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 ($T_a = 25^\circ\text{C}$)

Fig.9 Emitter Input Capacitance vs. Emitter-Base Voltage
Collector Output Capacitance vs. Collector-Base Voltage



Fig.10 Safe Operating Area

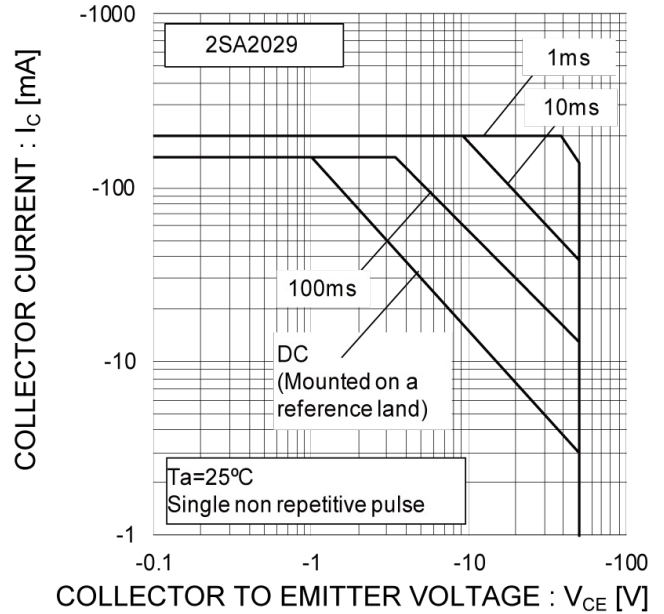


Fig.11 Safe Operating Area

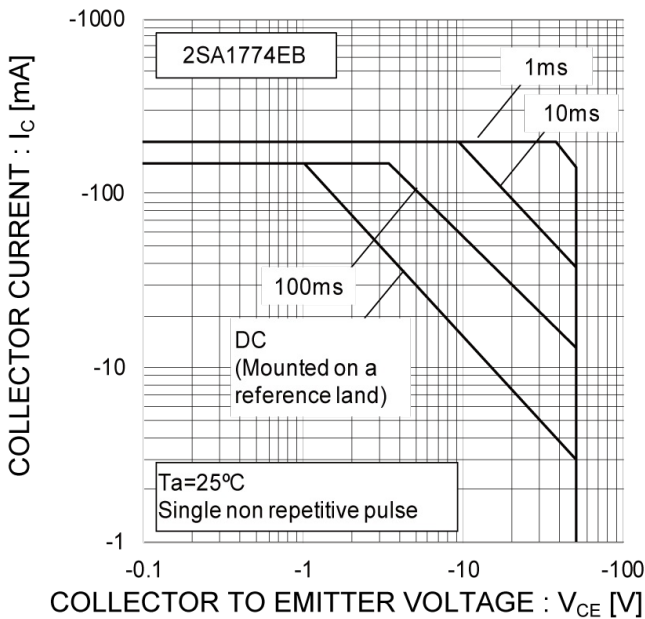
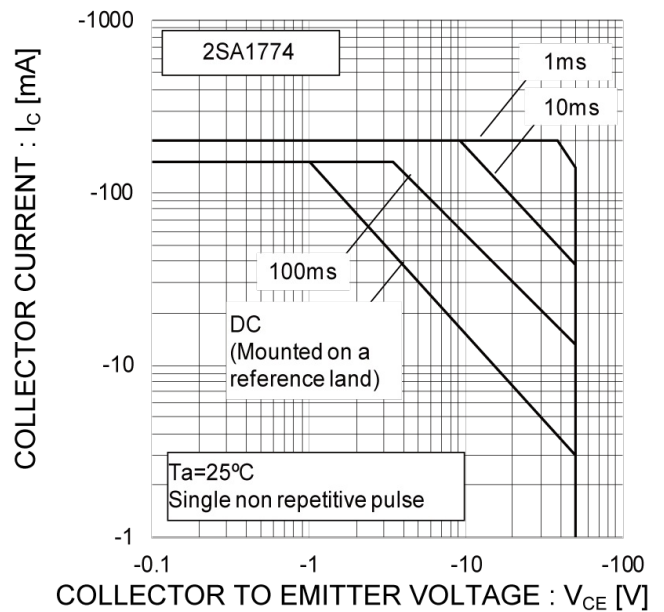


Fig.12 Safe Operating Area



●Electrical characteristic curves(Ta=25°C)

Fig.13 Safe Operating Area



Fig.14 Safe Operating Area

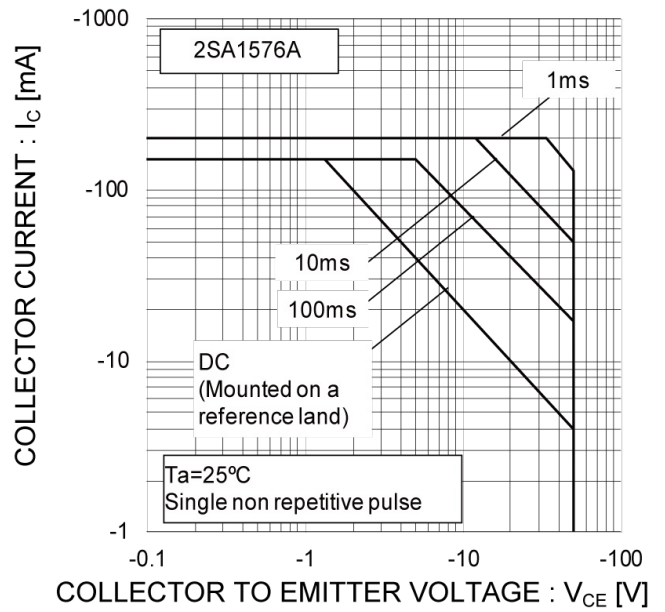
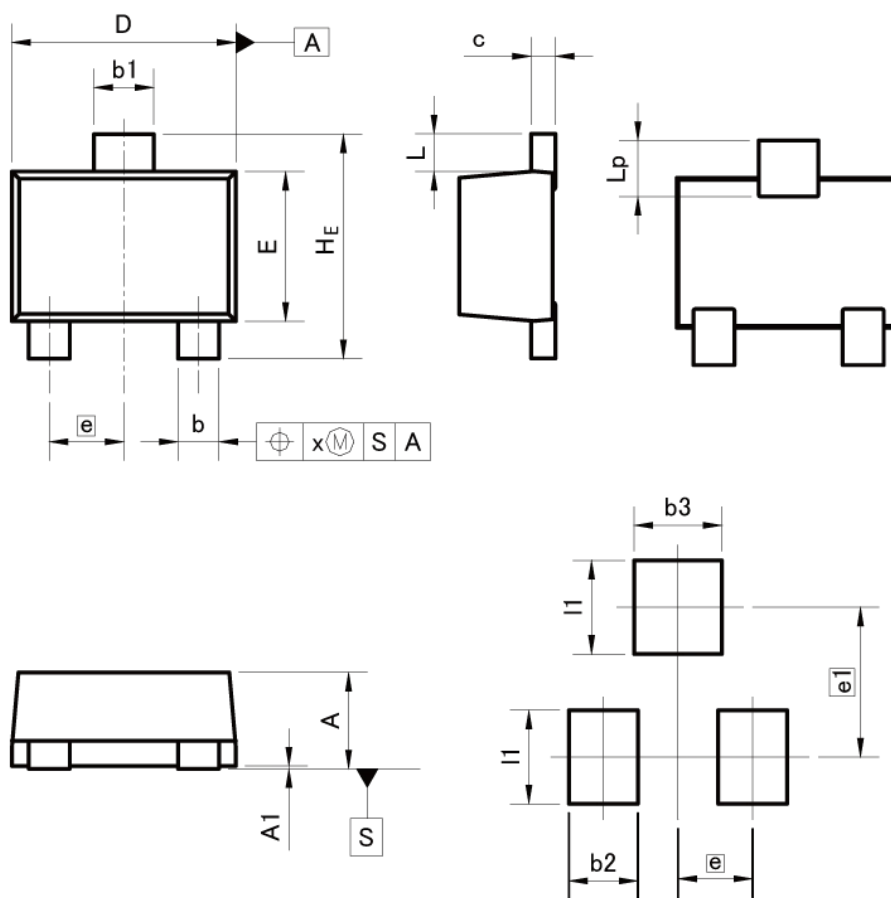


Fig.15 Safe Operating Area



●Dimensions

SOT-723
SC-105AA
(VMT3)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	0.012
Lp	0.20	0.40	0.008	0.016
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.37	-	0.015
b3	-	0.47	-	0.019
e1	0.80		0.031	
I1	-	0.50	-	0.020

Dimension in mm/inches

●Dimensions

SOT-416FL
SC-89
(EMT3F)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85	0.026	0.033
A1	0.00	0.10	0.000	0.004
A2	0.60	0.80	0.024	0.031
b	0.21	0.36	0.008	0.014
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	0.76	0.96	0.030	0.038
e	0.50		0.020	
HE	1.50	1.70	0.059	0.067
L	0.37		0.015	
Lp	0.35	0.55	0.014	0.022
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.46	-	0.018
e1	-	1.05	-	0.041
l1	-	0.65	-	0.026

Dimension in mm/inches

●Dimensions

SOT-416
SC-75A
(EMT3)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.60	0.80	0.024	0.031
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
b1	0.25	0.40	0.010	0.016
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
e	0.50		0.020	
HE	1.40	1.80	0.055	0.071
L1	0.10	-	0.004	-
Lp	0.15	-	0.006	-
Q	0.05	0.25	0.002	0.010
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.40	-	0.016
b3	-	0.50	-	0.020
e1	1.10		0.043	
l1	-	0.70	-	0.028

Dimension in mm/inches

●Dimensions



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	1.05	0.033	0.041
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.039
b	0.27	0.42	0.011	0.017
c	0.08	0.18	0.003	0.007
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L	0.43		0.017	
Lp	0.43	0.63	0.017	0.025
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.52	-	0.020
e1	1.47		0.058	
l1	-	0.83	-	0.033

Dimension in mm/inches

●Dimensions

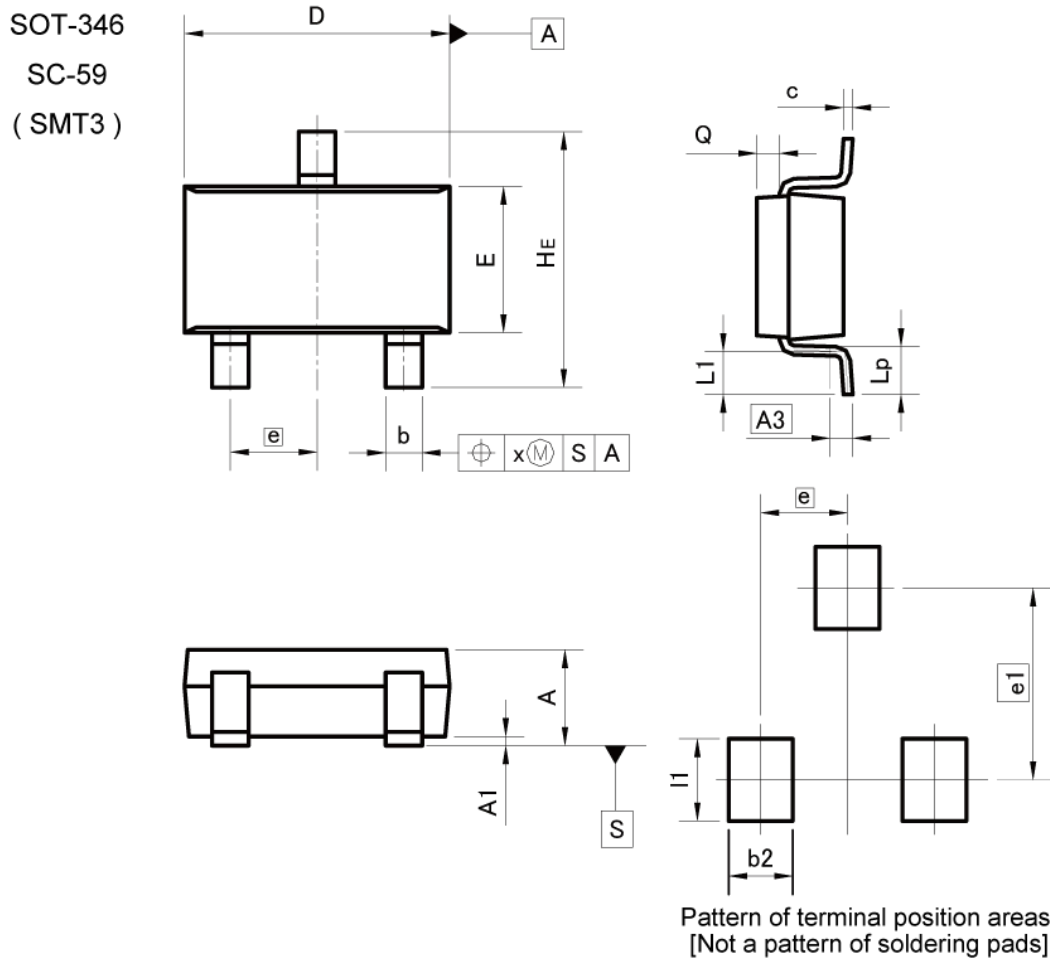


DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0	0.004
A3	0.25		0.01	
b	0.25	0.40	0.01	0.016
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.03	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.02
Lp	0.25	0.55	0.01	0.022
Q	0.10	0.30	0.004	0.012
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	1.55		0.06	
b2	-	0.50	-	0.02
l1	-	0.65	-	0.026

Dimension in mm/inches

●Dimensions



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.35	0.50	0.014	0.020
c	0.09	0.25	0.004	0.010
D	2.80	3.00	0.110	0.118
E	1.50	1.80	0.059	0.071
e	0.95		0.037	
HE	2.60	3.00	0.102	0.118
L1	0.30	0.60	0.012	0.024
Lp	0.40	0.70	0.016	0.028
Q	0.20	0.30	0.008	0.012
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.60	-	0.024
e1	2.10		0.083	
I1	-	0.90	-	0.035

Dimension in mm/inches

Notice

Precaution on using ROHM Products

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JAPAN	USA	EU	CHINA
CLASS III	CLASS III	CLASS II b	CLASS III
CLASS IV		CLASS III	

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 - Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - Sealing or coating our Products with resin or other coating materials
 - Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
- ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

- When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

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This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

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1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] the temperature or humidity exceeds those recommended by ROHM
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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