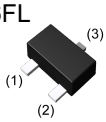
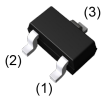
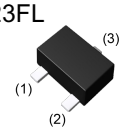
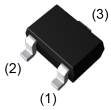
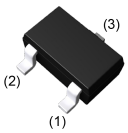
DTC144E series

NPN 100mA 50V Digital Transistor (Bias Resistor Built-in Transistor) Datasheet

Parameter	Value
V_{CC}	50V
$I_{C(MAX.)}$	100mA
R_1	47kΩ
R_2	47kΩ

●Outline

SOT-723 DTC144EM (VMT3)	SOT-416FL  DTC144EEB (EMT3F)
SOT-416  DTC144EE (EMT3)	SOT-323FL  DTC144EUB (UMT3F)
SOT-323  DTC144EUA (UMT3)	SOT-346  DTC144EKA (SMT3)

●Features

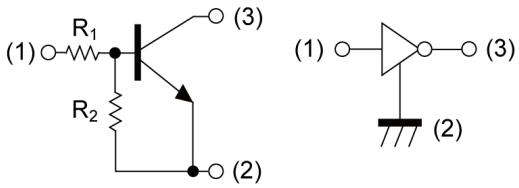
1) Built-In Biasing Resistors, $R_1 = R_2 = 47kΩ$
2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit) .
3) Only the on/off conditions need to be set for operation, making the circuit design easy.
4) Complementary PNP Types: DTA144E series

●Application

INVERTER, INTERFACE, DRIVER

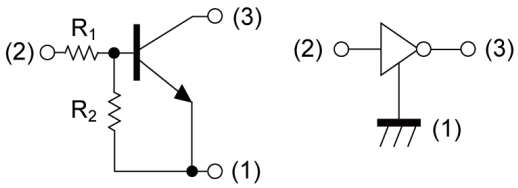
●Inner circuit

DTC144EM/ DTC144EEB/ DTC144EUB



(1) IN (BASE)
(2) GND (EMITTER)
(3) OUT (COLLECTOR)

DTC144EE/ DTC144EUA/ DTC144EKA



(1) GND (EMITTER)
(2) IN (BASE)
(3) OUT (COLLECTOR)

●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
DTC144EM	SOT-723	1212	T2L	180	8	8000	26
DTC144EEB	SOT-416FL	1616	TL	180	8	3000	26
DTC144EE	SOT-416	1616	TL	180	8	3000	26
DTC144EUB	SOT-323FL	2021	TL	180	8	3000	26
DTC144EUA	SOT-323	2021	T106	180	8	3000	26
DTC144EKA	SOT-346	2928	T146	180	8	3000	26

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●Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Values	Unit
Supply voltage		V_{CC}	50	V
Input voltage		V_{IN}	-10 to 40	V
Output current		I_O	30	mA
Collector current		$I_{C(MAX)}$ *1	100	mA
Power dissipation	DTC144EM	P_D *2	150	mW
	DTC144EEB		150	
	DTC144EE		150	
	DTC144EUB		200	
	DTC144EUA		200	
	DTC144EKA		200	
Junction temperature		T_j	150	℃
Range of storage temperature		T_{stg}	-55 to +150	℃

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input voltage	$V_{I(off)}$	V_{CC} = 5V, I_O = 100μA	-	-	0.5	V
	$V_{I(on)}$	V_O = 0.3V, I_O = 2mA	3.0	-	-	
Output voltage	$V_{O(on)}$	I_O = 10mA, I_I = 0.5mA	-	100	300	mV
Input current	I_I	V_I = 5V	-	-	180	μA
Output current	$I_{O(off)}$	V_{CC} = 50V, V_I = 0V	-	-	500	nA
DC current gain	G_I	V_O = 5V, I_O = 5mA	68	-	-	-
Input resistance	R_1	-	32.9	47	61.1	kΩ
Resistance ratio	R_2/R_1	-	0.8	1.0	1.2	-
Transition frequency	f_T *1	V_{CE} = 10V, I_E = -5mA, f = 100MHz	-	250	-	MHz

*1 Characteristics of built-in transistor

*2 Each terminal mounted on a reference land.

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●Electrical characteristic curves (T_a =25°C)

Fig.1 Input voltage vs. output current (ON characteristics)

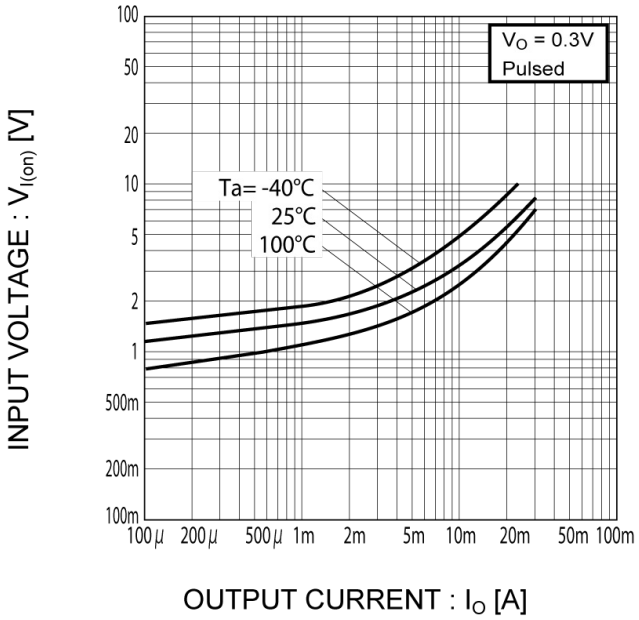


Fig.2 Output current vs. input voltage (OFF characteristics)

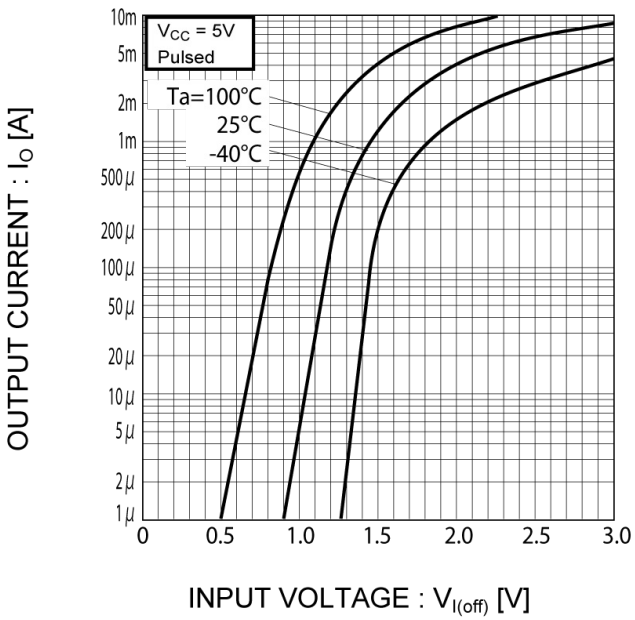


Fig.3 Output current vs. output voltage

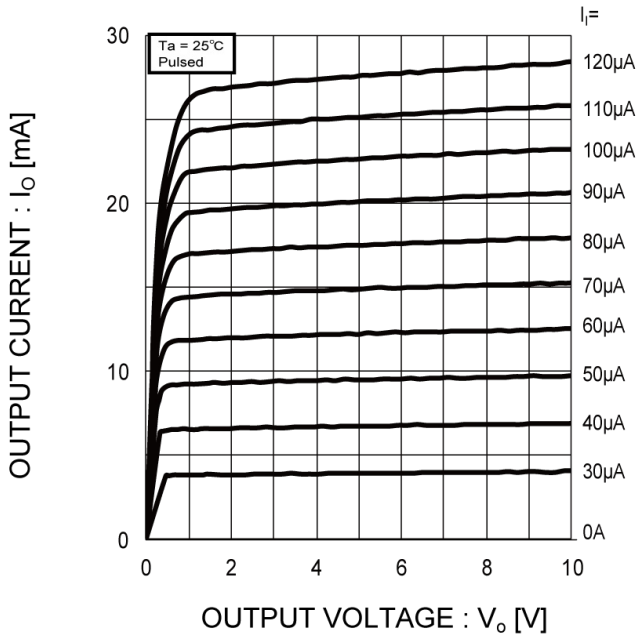
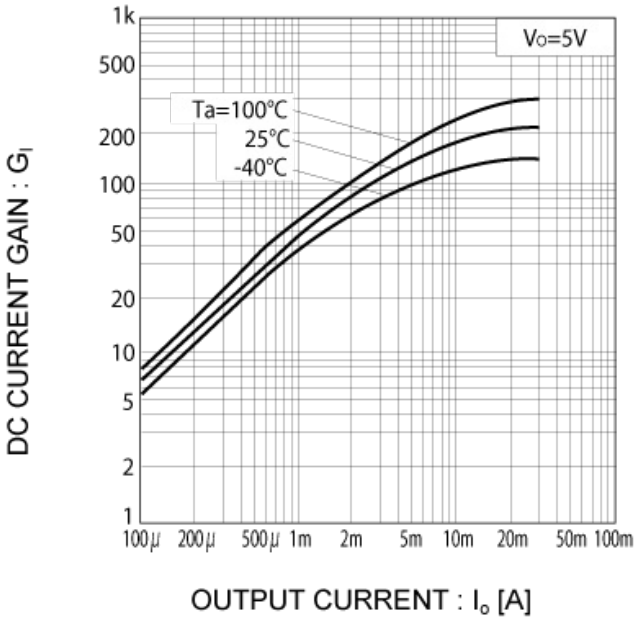


Fig.4 DC current gain vs. output current



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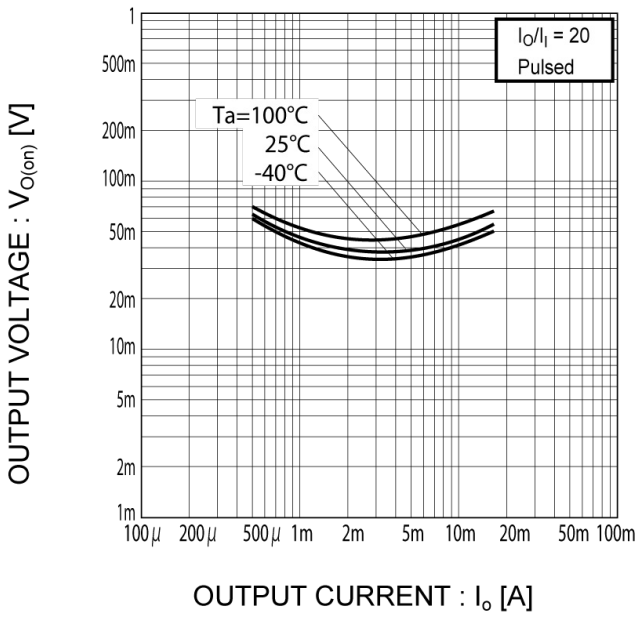
●Electrical characteristic curves (T_a =25°C)

Fig.5 Output voltage vs. output current



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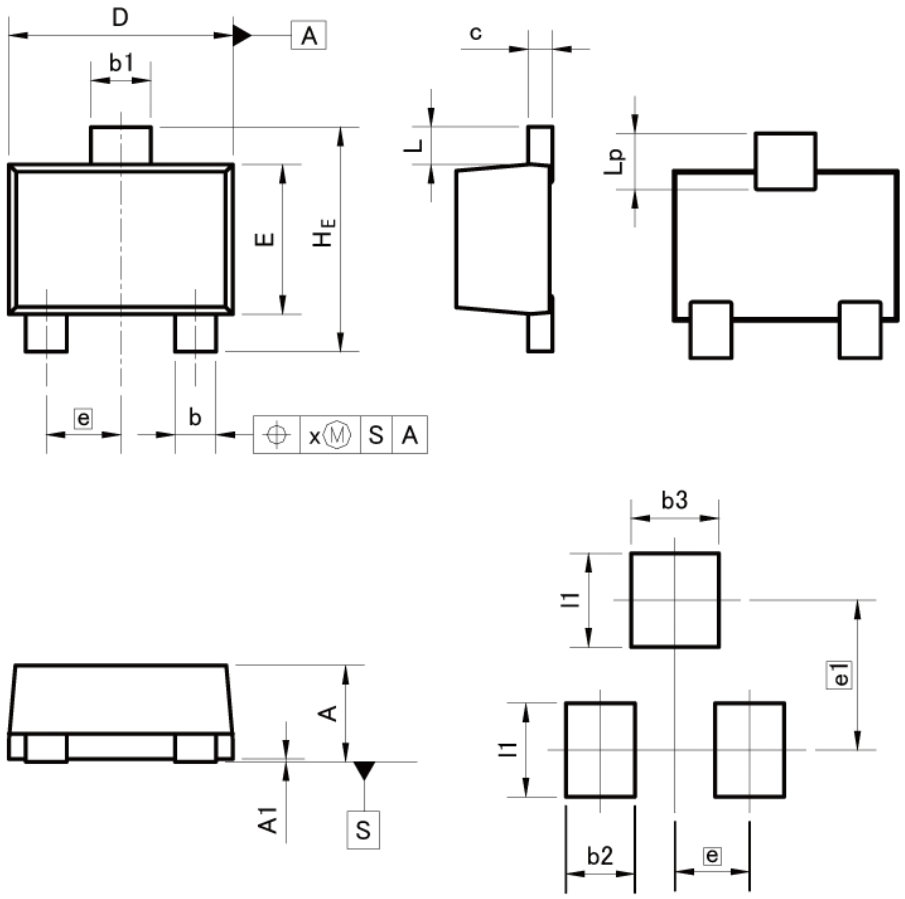
●Dimensions

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	
l1	−	0.50	−	0.020

Dimension in mm/inches

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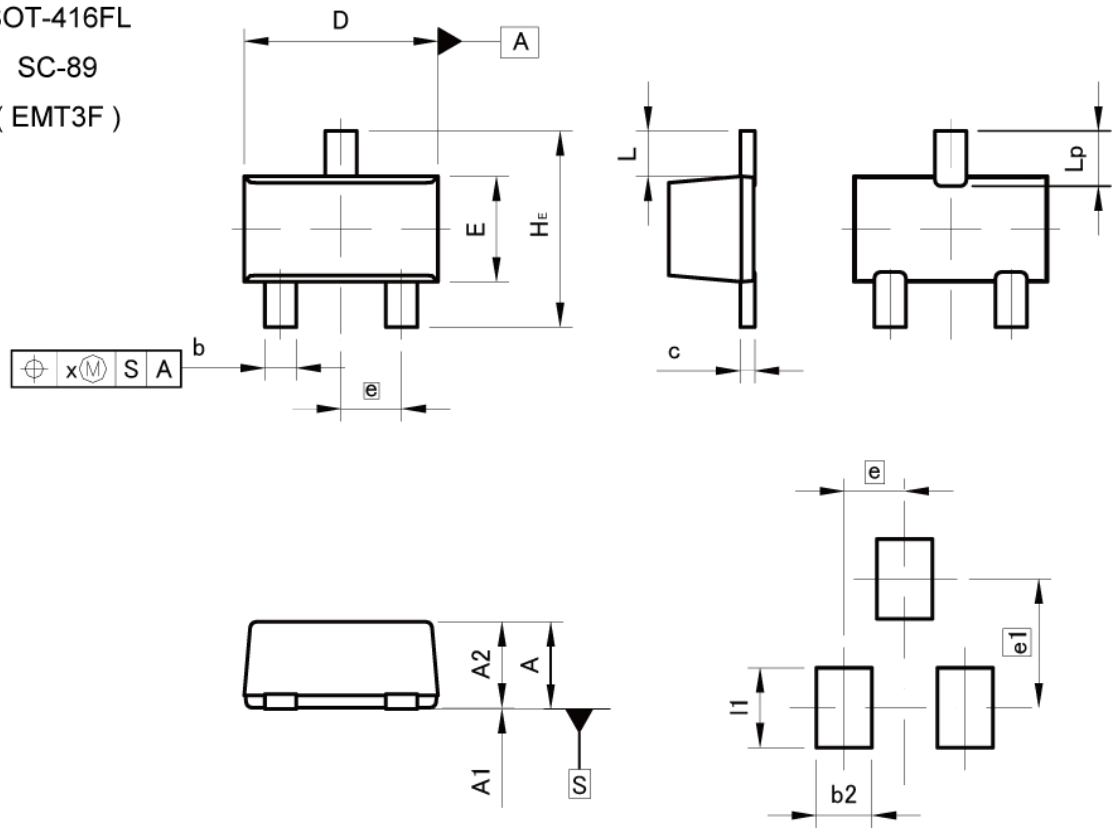
●Dimensions

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

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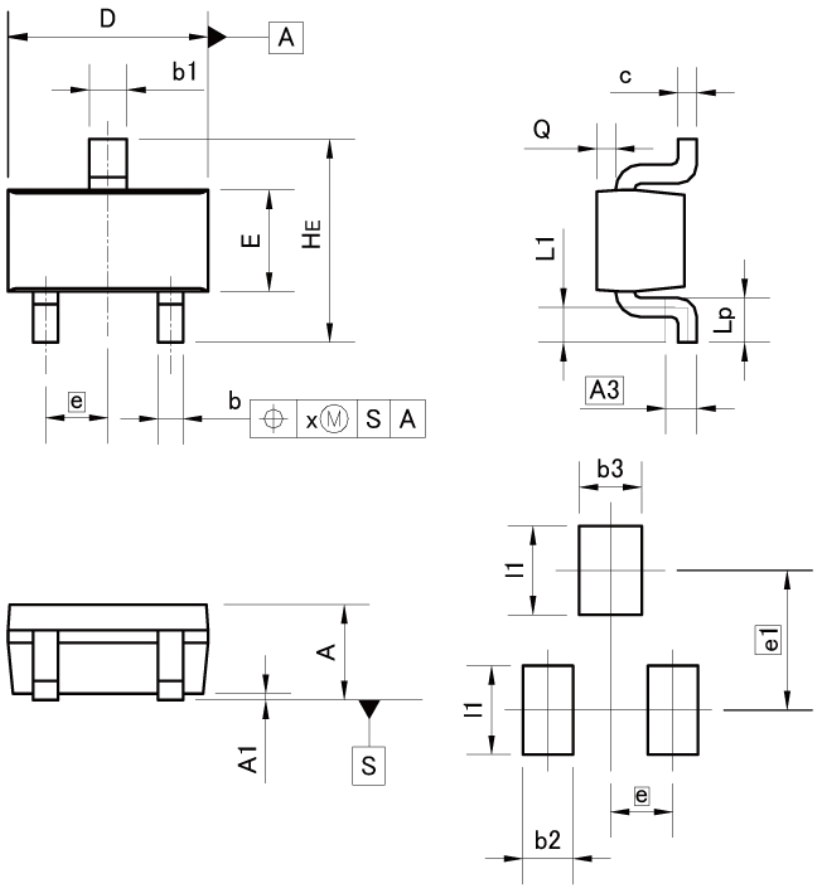
●Dimensions

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

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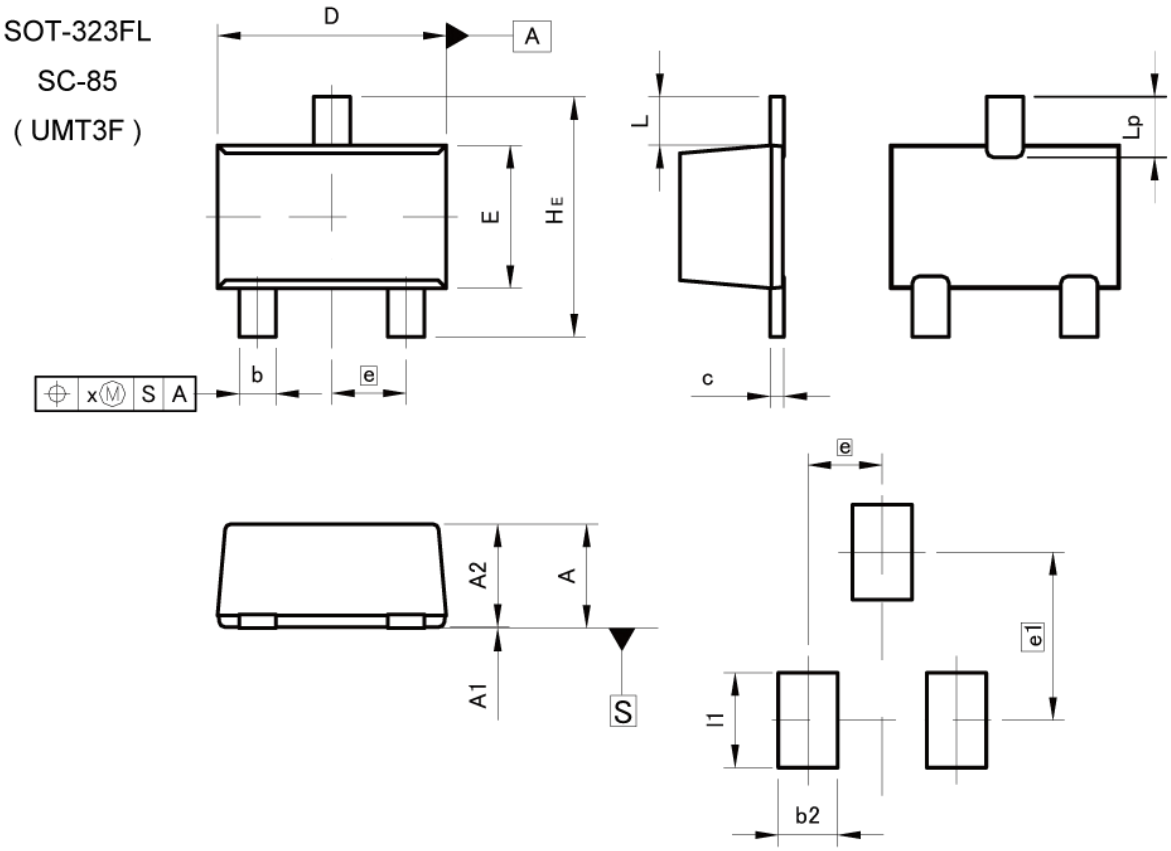
●Dimensions

SOT-323FL
SC-85
(UMT3F)



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

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

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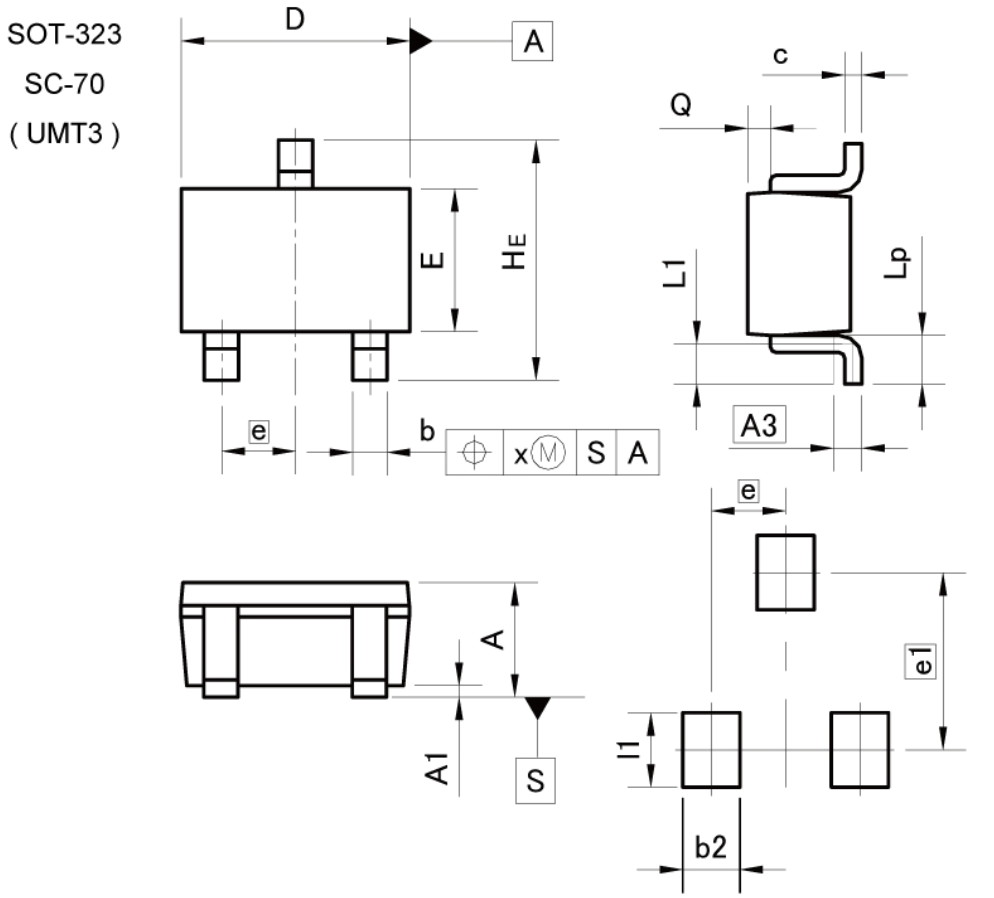
●Dimensions

SOT-323
SC-70
(UMT3)



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

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

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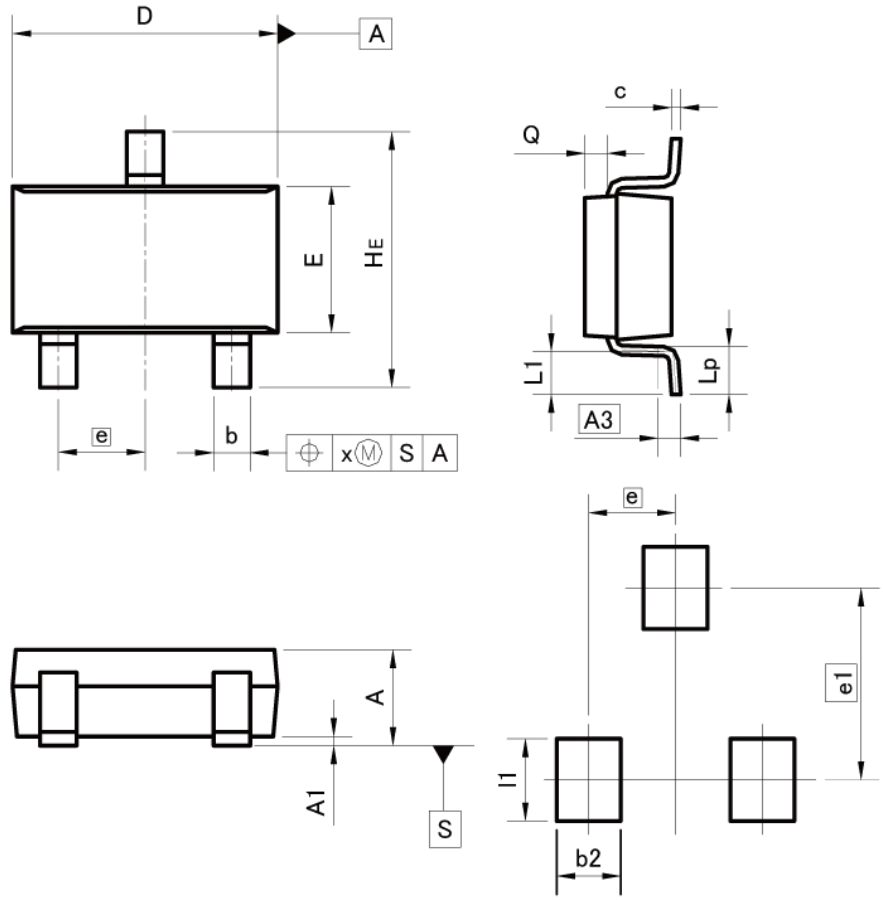
●Dimensions

SOT-346
SC-59
(SMT3)



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

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	
l1	–	0.90	–	0.035

Dimension in mm/inches

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