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

Datasheet

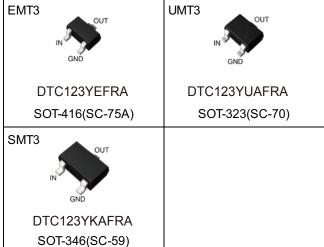
### **AEC-Q101 Qualified**

Parameter	Value
V <sub>CC</sub>	50V
I <sub>C(MAX.)</sub>	100mA
R <sub>1</sub>	2.2kΩ
R <sub>2</sub>	10kΩ

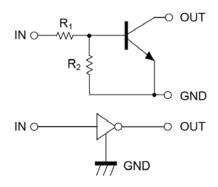
### Features

- 1) Built-In Biasing Resistors
- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit).
- 3) The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of completely eliminating parasitic effects.
- 4) Only the on/off conditions need to be set for operation, making the circuit design easy.
- 5) Complementary PNP Types: DTA123Y series
- 6) Lead Free/RoHS Compliant.

# ●Outline FMT3



### •Inner circuit



## Application

Switching circuit, Inverter circuit, Interface circuit, Driver circuit

### Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
DTC123YEFRA	EMT3	1616	TL	180	8	3000	62
DTC123YUAFRA	UMT3	2021	T106	180	8	3000	62
DTC123YKAFRA	SMT3	2928	T146	180	8	3000	62

# • Absolute maximum ratings $(T_a = 25^{\circ}C)$

F	Parameter	Symbol	Values	Unit
Supply voltage		V <sub>CC</sub>	50	V
Input voltage		V <sub>IN</sub>	-5 to 12	V
Output current			100	mA
Collector current			100	mA
	DTC123YEFRA		150	
Power dissipation	DTC123YUAFRA	P <sub>D</sub> *2	200	mW
		200		
Junction temperature			150	°C
Range of storage temperature			-55 to +150	°C

# ● Electrical characteristics (T<sub>a</sub> = 25°C)

Parameter	Cymhal	Conditions	Values			Unit	
Parameter	Symbol	Conditions	Min.	Тур.	Max.	UTIIL	
lance to college	$V_{I(off)}$	$V_{CC} = 5V, I_{O} = 100 \mu A$ -		-	0.3		
Input voltage	V <sub>I(on)</sub>	V <sub>O</sub> = 0.3V, I <sub>O</sub> = 20mA	3	-	-	\ \ \	
Output voltage	V <sub>O(on)</sub>	$I_{O}/I_{I} = 10 \text{mA} / 0.5 \text{mA}$	1	0.1	0.3	V	
Input current	l <sub>l</sub>	V <sub>I</sub> = 5V	ı	ı	3.8	mA	
Output current	I <sub>O(off)</sub>	$V_{CC} = 50V, V_{I} = 0V$	1	-	0.5	μA	
DC current gain	G <sub>I</sub>	V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA	33	ı	-	-	
Input resistance	R <sub>1</sub>	-	1.54	2.2	2.86	kΩ	
Resistance ratio	R <sub>2</sub> /R <sub>1</sub>	-	3.6	4.5	5.5	-	
Transition frequency	f <sub>T</sub> *1	V <sub>CE</sub> = 10V, I <sub>E</sub> = -5mA, f = 100MHz	-	250	-	MHz	

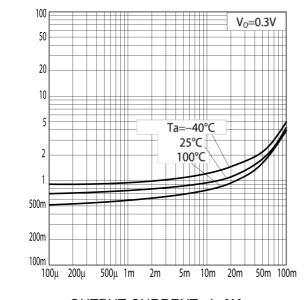
<sup>\*1</sup> Characteristics of built-in transistor

<sup>\*2</sup> Each terminal mounted on a reference footprint

INPUT VOLTAGE: V<sub>I(on)</sub> [V]

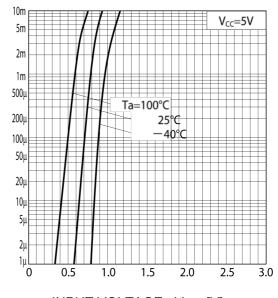
# ● Electrical characteristic curves (T<sub>a</sub> =25°C)

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



OUTPUT CURRENT : Io [A]

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



OUTPUT CURRENT: Io [A]

INPUT VOLTAGE: V<sub>I(off)</sub> [V]

Fig.3 Output current vs. output voltage

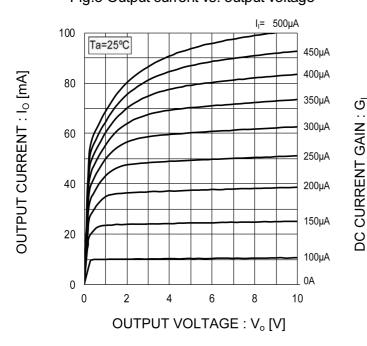
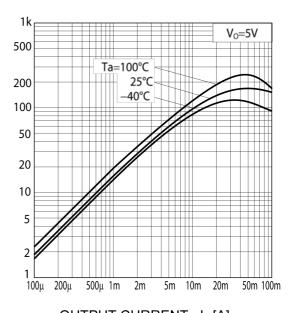


Fig.4 DC current gain vs. output current



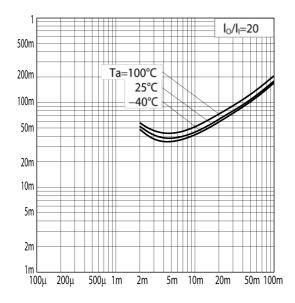
OUTPUT CURRENT : Io [A]

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# ● Electrical characteristic curves (T<sub>a</sub> =25°C)

Fig.5 Output voltage vs. output current

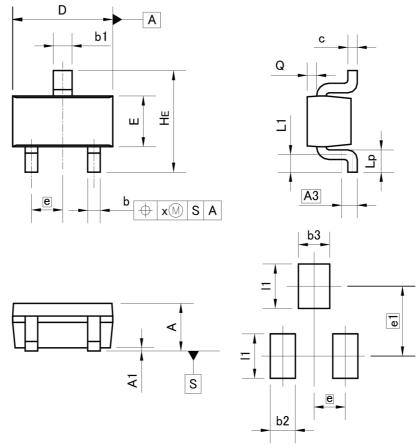




OUTPUT CURRENT : Io [A]

# Dimensions

EMT3



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

DIM -	MILIM	ETERS	INC	HES
DIM [	MIN	MAX	MIN	MAX
Α	0.60	0.80	0.024	0.031
A1	0.00	0.10	0.000	0.004
A3	0.	25	0.0	10
b	0.15	0.30	0.006	0.012
b1	0.25	0.40	0.010	0.016
С	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
е	0.	50	0.0	20
HE	1.40	1.80	0.055	0.071
L1	0.10	-	0.004	<del></del>
Lp	0.15	=:	0.006	π.
Q	0.05	0.25	0.002	0.010
x	<b>2</b> 0	0.10	-	0.004

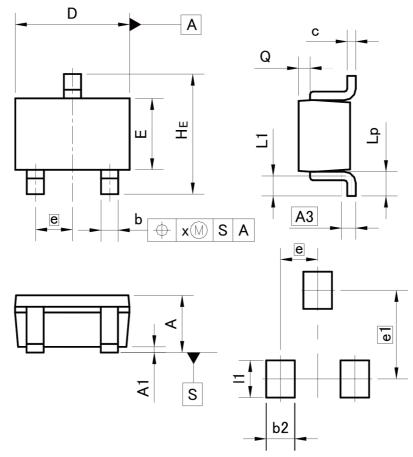
DIM MILIM		ETERS	INC	HES
DIM [	MIN	MAX	MIN	MAX
b2	777//	0.40	52	0.016
b3	<del></del>	0.50	-	0.020
e1	1.10		0.0	043
11	<b>₩</b> 8	0.70	-	0.028

Dimension in mm/inches



# Dimensions

UMT3



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

DIM	MILIM	ETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A3	0.3	25	0.0	10
b	0.15	0.30	0.006	0.012
С	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
е	0.0	65	0.0	26
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.020
Lp	0.25	0.55	0.010	0.022
Q	0.10	0.30	0.004	0.012
x	-	0.10	450	0.004

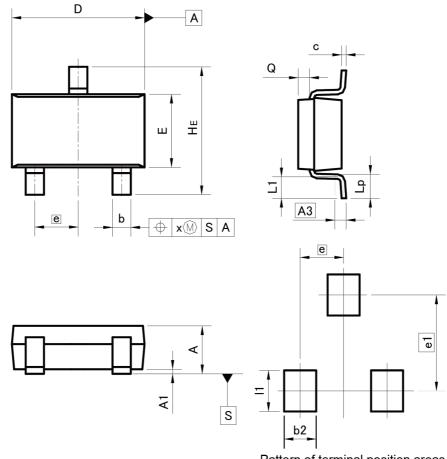
DIM MILIMI	ETERS	INC	HES	
DIM	MIN	MAX	MIN	MAX
b2	-	0.50	=	0.020
e1	1.55		0.0	061
11	-	0.65	_	0.026

Dimension in mm/inches



# Dimensions

SMT3



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

DIM	MILIM	ETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
A3	0.:	0.25		10
b	0.35	0.50	0.014	0.020
С	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
е	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	(20)	0.10		0.004
У	<u>(4</u> )	0.10	=	0.004
DIM	MILIM	ETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
b2	(E)	0.60	-	0.024
e1	2.10		0.0	

Dimension in mm/inches

11



0.035

0.90

# **Notice**

### **Precaution on using ROHM Products**

1. If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment (Note 1), aircraft/spacecraft, nuclear power controllers, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

Ì	JÁPAN	USA	EU	CHINA
Γ	CLASSⅢ	CL ACCTI	CLASS II b	CI VCCIII
Γ	CLASSIV	CLASSⅢ	CLASSⅢ	CLASSⅢ

- 2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
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  - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure
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  - [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
  - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
  - [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
  - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
  - [f] Sealing or coating our Products with resin or other coating materials
  - [g] 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
  - [h] Use of the Products in places subject to dew condensation
- 4. The Products are not subject to radiation-proof design.
- 5. Please verify and confirm characteristics of the final or mounted products in using the Products.
- 6. 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.
- 7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- 8. Confirm that operation temperature is within the specified range described in the product specification.
- 9. 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

- 1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- 2. 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.

For details, please refer to ROHM Mounting specification

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### **Precautions Regarding Application Examples and External Circuits**

- 1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
- 2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

#### **Precaution for Electrostatic**

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 lonizer, friction prevention and temperature / humidity control).

### **Precaution for Storage / Transportation**

- 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.

### **Precaution for Product Label**

QR code printed on ROHM Products label is for ROHM's internal use only.

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When disposing Products please dispose them properly using an authorized industry waste company.

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