

For switching and interface circuit and drivecircuit applications

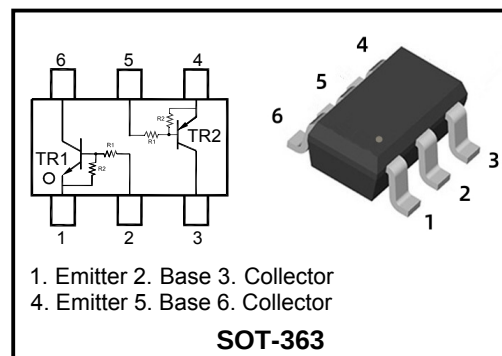
Features

Transistors with different polarity and built-in bias

resistors R1(47 KΩ) and R2(47 KΩ)

Simplification of circuit design

Reduces number of components and board space



Marking Code

PUMD12,115-CN

D1

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Value	Unit
Collector Base Voltage	V_{CBO}	50	V
Collector Emitter Voltage	V_{CEO}	50	V
Emitter Base Voltage	V_{EBO}	10	V
InputVoltage	V_I	+ 40	V
Negative		- 10	
Collector Current	I_C	100	mA
Peak Collector Current	I_{CM}	100	mA
Total Power Dissipation	P_{tot}	200	mW
Junction Temperature	T_j	150	°C
Operating ambient and Storage Temperature Range	T_{stg}	- 65 to + 150	°C

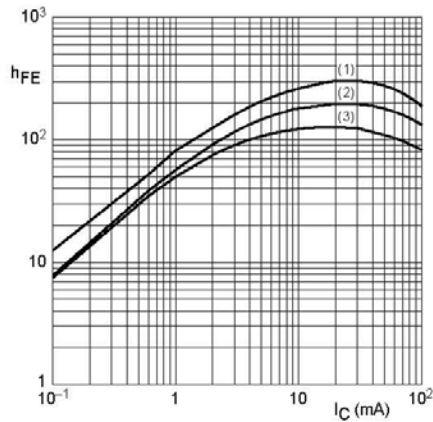
Characteristics at Ta = 25°C (TR1:NPN)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$	h_{FE}	80	-	-	-
Collector Base Cutoff Current at $V_{CB} = 50\text{ V}$	I_{CBO}	-	-	100	nA
Collector Emitter Cutoff Current at $V_{CE} = 30\text{ V}$	I_{CEO}	-	-	1	μA
Emitter Base Cutoff Current at $V_{EB} = 5\text{ V}$	I_{EBO}	-	-	90	μA
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$	$V_{CE(sat)}$	-	-	0.15	V
Input Voltage (OFF) at $V_{CE} = 5\text{ V}$, $I_C = 100\text{ μA}$	$V_{I(OFF)}$	0.8	-	-	V
Input Voltage (ON) at $V_{CE} = 0.3\text{ V}$, $I_C = 2\text{ mA}$	$V_{I(ON)}$	-	-	3	V
Collector Output capacitance at $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{ob}	-	-	2.5	pF
Input Resistance	R_1	33	47	61	KΩ
Resistance Ratio	R_1/R_2	0.8	1	1.2	-

Characteristics at Ta = 25°C (TR2:PNP)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain at $-V_{CE} = 5\text{ V}$, $-I_C = 5\text{ mA}$	h_{FE}	80	-	-	-
Collector Base Cutoff Current at $-V_{CB} = 50\text{ V}$	$-I_{CBO}$	-	-	100	nA
Collector Emitter Cutoff Current at $-V_{CE} = 30\text{ V}$	$-I_{CEO}$	-	-	1	μA
Emitter Base Cutoff Current at $-V_{EB} = 5\text{ V}$	$-I_{EBO}$	-	-	90	μA
Collector Emitter Saturation Voltage at $-I_C = 10\text{ mA}$, $-I_B = 0.5\text{ mA}$	$-V_{CEsat}$	-	-	0.15	V
Input Voltage (OFF) at $-V_{CE} = 5\text{ V}$, $-I_C = 100\text{ }\mu\text{A}$	$-V_{I(OFF)}$	0.8	-	-	V
Input Voltage (ON) at $-V_{CE} = 0.3\text{ V}$, $-I_C = 2\text{ mA}$	$-V_{I(ON)}$	-	-	3	V
Collector Output capacitance at $-V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{ob}	-	-	3	pF
Input Resistance	R_1	33	47	61	K Ω
Resistance Ratio	R_1/R_2	0.8	1	1.2	-

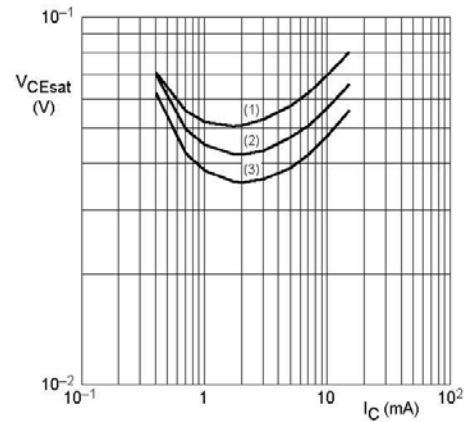
Typical Characteristics



TR1 (NPN); $V_{CE} = 5\text{ V}$.

- (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$.

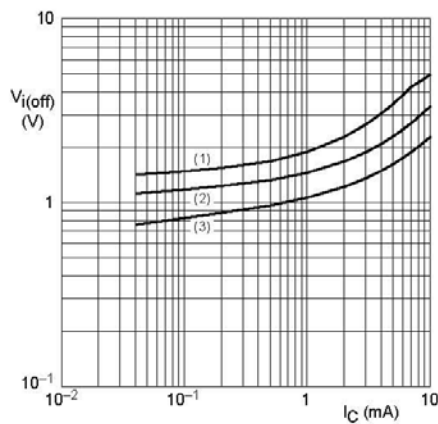
Fig. 1 DC current gain as a function of collector current; typical values.



TR1 (NPN); $I_C/I_B = 20$.

- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$.

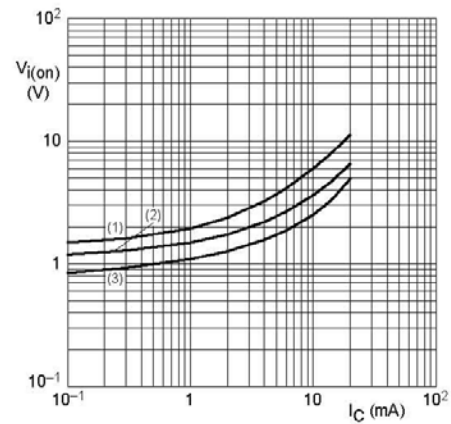
Fig. 2 Collector-emitter saturation voltage as a function of collector current; typical values.



TR1 (NPN); $V_{CE} = 5\text{ V}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$.

Fig. 3 Input-off voltage as a function of collector current; typical values.

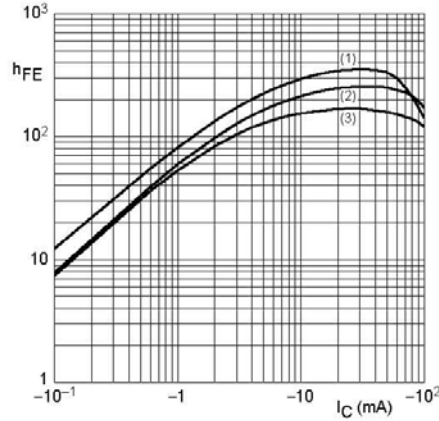


TR1 (NPN); $V_{CE} = 0.3\text{ V}$.

- (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$.

Fig. 4 Input-on voltage as a function of collector current; typical values.

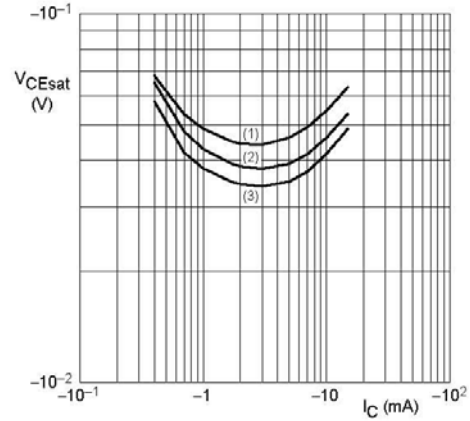
Typical Characteristics



TR2 (PNP); $V_{CE} = -5$ V.

- (1) $T_{amb} = 150$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -40$ °C.

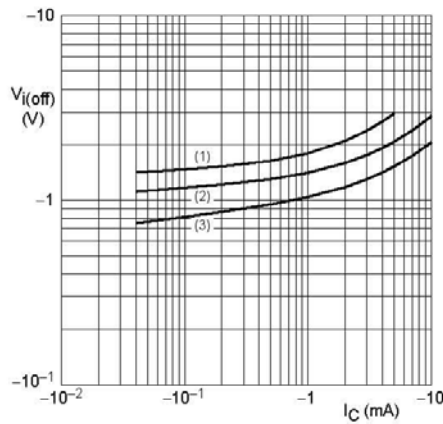
Fig. 5 DC current gain as a function of collector current; typical values.



TR2 (PNP); $I_C/I_B = 20$.

- (1) $T_{amb} = 100$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -40$ °C.

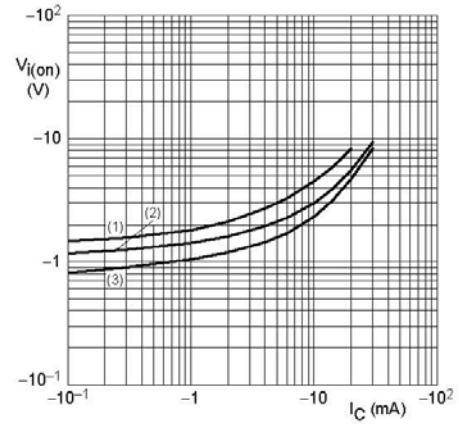
Fig. 6 Collector-emitter saturation voltage as a function of collector current; typical values.



TR2 (PNP); $V_{CE} = -5$ V.

- (1) $T_{amb} = -40$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 100$ °C.

Fig. 7 Input-off voltage as a function of collector current; typical values.



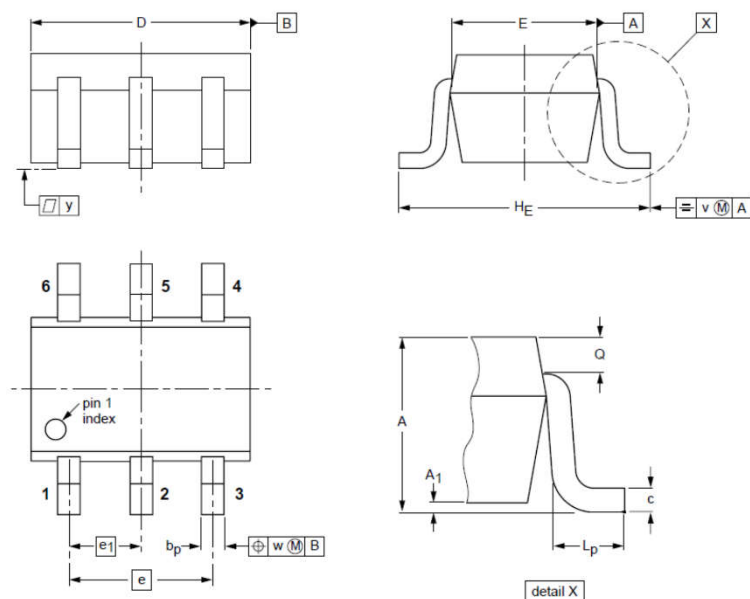
TR2 (PNP); $V_{CE} = -0.3$ V.

- (1) $T_{amb} = -40$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 100$ °C.

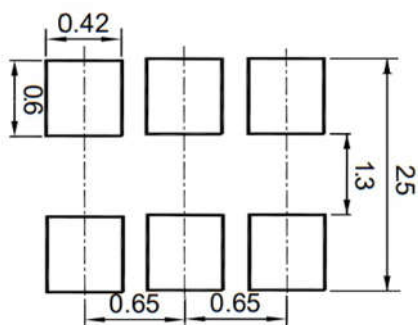
Fig. 8 Input-on voltage as a function of collector current; typical values.

Ordering information

Package	Packing Description	Packing Quantity
SOT-363	Tape/Reel, 7" reel	3000PCS/Reel 120000PCS/Carton

Package Dimensions
SOT-363


Dim.	Millimeter(mm)		mil	
	Min.	Max.	Min.	Max.
A	0.8	1.1	32	43
A1	-	0.1	-	3.94
bp	0.20	0.30	7.87	11.81
c	0.10	0.25	3.94	9.84
D	1.8	2.2	70.87	86.61
E	1.15	1.35	45.28	53.15
e	1.3		51.18	
e1	0.65		25.6	
HE	2.0	2.2	78.74	86.6
Lp	0.15	0.45	5.90	17.71
Q	0.15	0.25	5.90	9.84
v	0.2		7.78	
w	0.2		7.78	
y	0.1		3.94	

The recommended mounting pad size


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