PUMD30,115 Datasheet

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DiGi Electronics Part Number	PUMD30,115-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PUMD30,115
Description	TRANS PREBIAS 1NPN 1PNP 6TSSOP
Detailed Description	Pre-Biased Bipolar Transistor (BJT) 1 NPN, 1 PNP - Pre-Biased (Dual) 50V 100mA 300mW Surface Mount 6-TSSOP

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
PUMD30,115	Nexperia USA Inc.
Series:	Product Status:
-	Active
Transistor Type:	Current - Collector (Ic) (Max):
1 NPN, 1 PNP - Pre-Biased (Dual)	100mA
Voltage - Collector Emitter Breakdown (Max):	Resistor - Base (R1):
50V	2.2kOhms
Resistor - Emitter Base (R2):	DC Current Gain (hFE) (Min) @ Ic, Vce:
-	30 @ 20mA, 5V
Vce Saturation (Max) @ Ib, Ic:	Current - Collector Cutoff (Max):
150mV @ 500µA, 10mA	1µA
Frequency - Transition:	Power - Max:
-	300mW
Grade:	Qualification:
Automotive	AEC-Q100
Mounting Type:	Package / Case:
Surface Mount	6-TSSOP, SC-88, SOT-363
Supplier Device Package:	Base Product Number:
6-TSSOP	PUMD30

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.21.0095	

PUMD30

50 V, 100 mA NPN/PNP resistor-equipped double transistor; R1 = 2.2 kΩ, R2 = open

31 March 2023 Product data sheet

1. General description

NPN/PNP double Resistor-Equipped Transistor (RET) in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PUMH30

PNP/PNP complement: PUMB30

2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplified circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

3. Applications

- Low current peripheral driver
- Cost-saving alternative for BC847BPN
- Controlling IC inputs
- Switching loads

4. Quick reference data

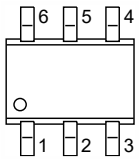
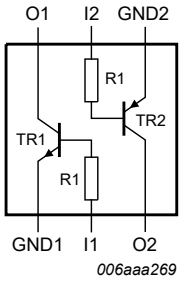
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V_{CEO}	collector-emitter voltage	open base	[1]	-	-	50	V
I_O	output current		[1]	-	-	100	mA
R1	bias resistor 1 (input)		[2]	1.54	2.2	2.86	kΩ

[1] For the PNP transistor with negative polarity.
[2] See section "Test information" for resistor calculation and test conditions.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1	 TSSOP6 (SOT363)	
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PUMD30	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PUMD30	%B3

[1] % = placeholder for manufacturing site code

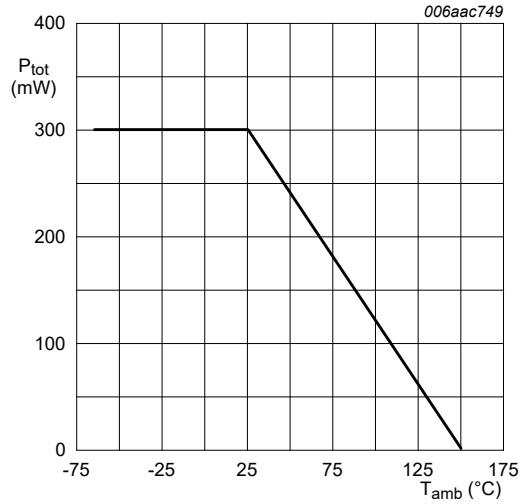
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V_{CBO}	collector-base voltage	open emitter	[1]	-	50	V
V_{CEO}	collector-emitter voltage	open base	[1]	-	50	V
V_{EBO}	emitter-base voltage	open collector	[1]	-	5	V
I_O	output current		[1]	-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	300	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] For the PNP transistor with negative polarity.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

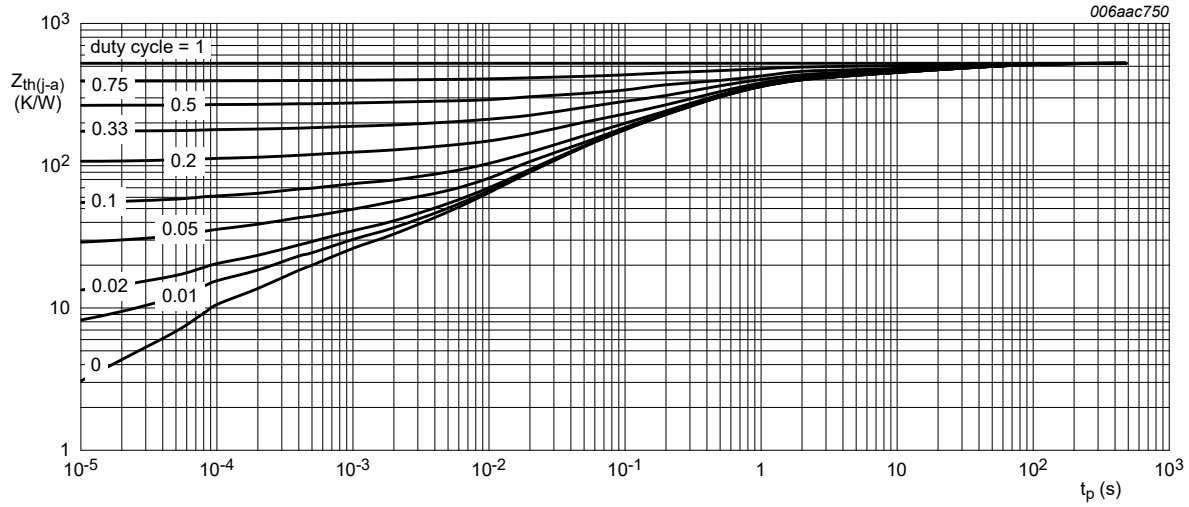
Fig. 1. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

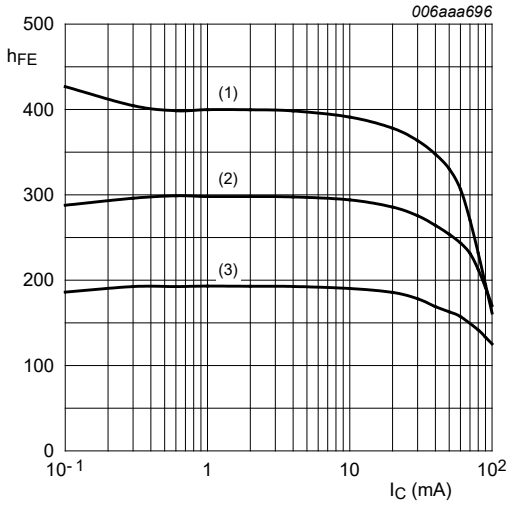
Fig. 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

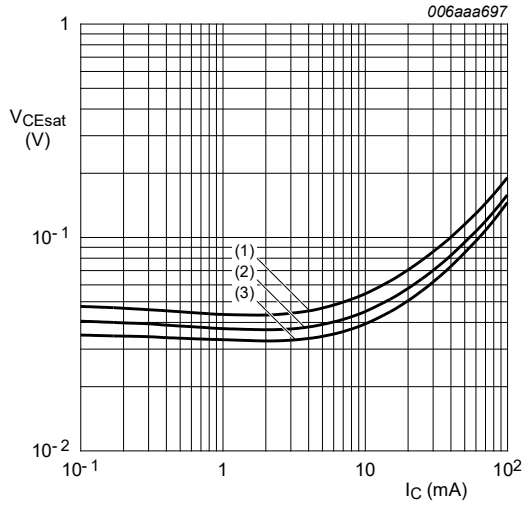
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A; T_{amb} = 25 °C	[1]	50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 2 mA; I_B = 0 A; T_{amb} = 25 °C	[1]	50	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0 A; T_{amb} = 25 °C	[1]	-	-	100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0 A; T_{amb} = 25 °C	[1]	-	-	100	nA
		V_{CE} = 30 V; I_B = 0 A; T_j = 150 °C	[1]	-	-	5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C	[1]	-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 20 mA; T_{amb} = 25 °C	[1]	30	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25 °C	[1]	-	-	150	mV
R1	bias resistor 1 (input)		[2]	1.54	2.2	2.86	kΩ
TR1 (NPN)							
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	2.5	pF
TR2 (PNP)							
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	3	pF

[1] For the PNP transistor with negative polarity.
[2] See section "Test information" for resistor calculation and test conditions.



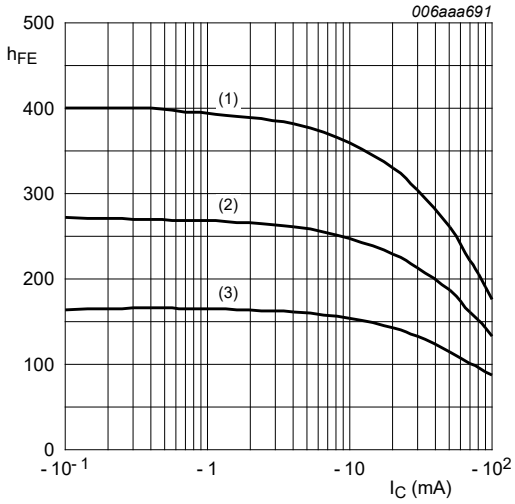
V_{CE} = 5 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 3. TR1 (NPN): DC current gain as a function of collector current; typical values



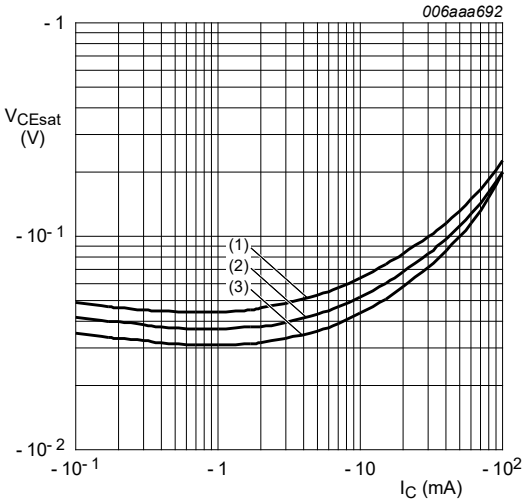
I_C/I_B = 20
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



V_{CE} = -5 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 5. TR2 (PNP): DC current gain as a function of collector current; typical values



I_C/I_B = 20
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

Fig. 6. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

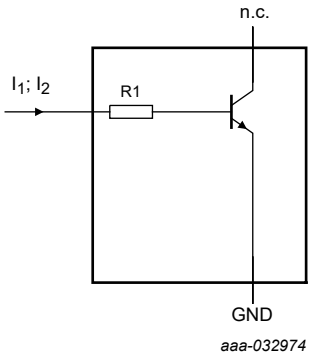


Fig. 7. TR1 (NPN): Resistor test circuit

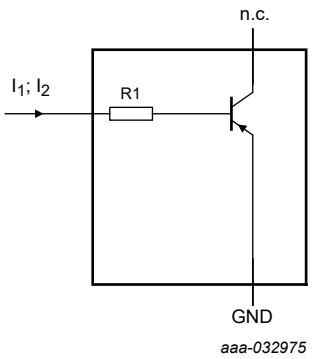


Fig. 8. TR2 (PNP): Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

PUMD30	R1 (kΩ)	R2 (kΩ)	Test conditions	
			I_1	I_2
TR1 (NPN)	2.2	open	750 µA	950 µA
TR2 (PNP)	2.2	open	-750 µA	-950 µA

12. Package outline

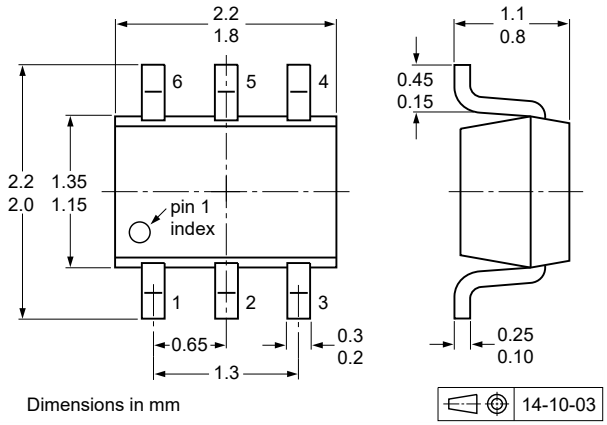


Fig. 9. Package outline TSSOP6 (SOT363)

13. Soldering

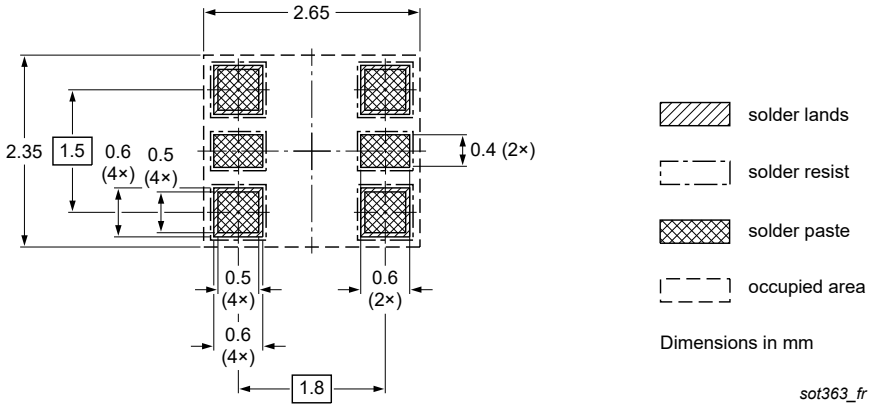


Fig. 10. Reflow soldering footprint for TSSOP6 (SOT363)

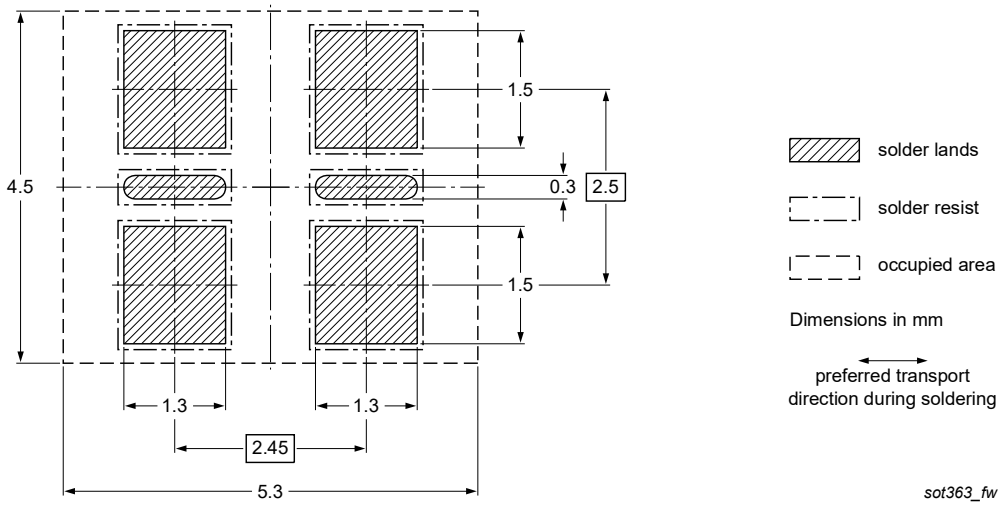


Fig. 11. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PUMD30 v.2	20230331	Product data sheet	-	PEMD30_PUMD30 v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Family data sheet reduced to single type data sheet. • Packing information removed.			
PEMD30_PUMD30 v.1	20060331	Product data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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Date of release: 31 March 2023

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