

### RoHS Compliant

PNP 2N5679, 2N5680 NPN 2N5681, 2N5682



### **DEVICE MARKING**

Full part number

### **GENERAL DESCRIPTION**

The 2N5679, 2N5680, 2N5681 2N5682 series devices are complementary silicon power transistors, manufactured by the epitaxial planar process, designed for general-purpose amplifier and switching applications where high voltages are required. TO-39, Metal Can Package.

### **FEATURE:**

- 1. High Voltage V<sub>CEO</sub> = 120V (Max).
- 2. Hermetically sealed device
- 3. High current

### ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C Unless otherwise specified)

PARAMETER			VA		
		SYMBOL	2N5679 2N5681	2N5680 2N5682	UNIT
Collector - Base Voltage		V <sub>CBO</sub>	100	120	V
Collector - Emitter Voltage		V <sub>CEO</sub>	100	120	V
Emitter - Base Voltage		$V_{EBO}$	4.0		V
Continuous Collector Current		Ic	1.0		Α
Base Current		IΒ	0.5		Α
Total Power Dissipation	@T <sub>A</sub> =25°C	D-	P <sub>D</sub> 1.0 5.7		W
	Derating above@T <sub>A</sub> =25°C	FD			mW/°C
Total Power Dissipation	@T <sub>C</sub> =25°C	P <sub>D</sub>	10.0		W
	Derating above@Tc=25°C		57.0		mW/°C
Operating & Storage Junction Temperature Range		$T_J,T_stg$	-65 to +200		°C
THERMAL RESISTANCE					
Thermal Resistance Junction-to-Ambient		$R_{\theta JA}$	175.0		°C/W
Thermal Resistance Junction-to-Case		$R_{\theta JC}$	17.5		°C/W



### **ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT	
Callagton Fraitten Valtage	2N5679, 2N5681	1	L = 10mA L = 0	100			V	
Collector – Emitter Voltage	2N5680 2N5682	V <sub>CEO(SUS)</sub> <sup>1</sup>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0	120			V	
	•		V <sub>CE</sub> = 100V I <sub>E</sub> = 0			1.0		
		I <sub>CBO</sub>	V <sub>CE</sub> = 120V I <sub>E</sub> = 0			1.0	μA	
0 11 1 0 10 10 1			V <sub>CE</sub> = 70V I <sub>B</sub> = 0			10	μА	
Collector Cut-Off Current		I <sub>CEO</sub>	$V_{CE} = 80V I_{B} = 0$	1		10		
			$V_{CE} = 100V V_{BE} = 1.5V$			1.0		
		I <sub>CEX</sub>	$V_{CE} = 120V V_{BE} = 1.5V$			1.0	μA	
Collector Cut-Off Current	T <sub>C</sub> =150°C	"CEX	$V_{CE} = 100V V_{BE} = 1.5V$			1.0	μA	
	1.0 1.00 0		V <sub>CE</sub> = 120V V <sub>BE</sub> = 1.5V			1.0		
Emitter-Cut off Current	T	I <sub>EBO</sub>	$V_{EB} = 4V, I_{C} = 0$			1.0	μΑ	
DC Current Gain	2N5679, 2N5681	h <sub>FE</sub> <sup>1</sup>	$I_C = 1.0A$ , $V_{CE} = 2V$	5.0				
DC Current Gain			$I_C = 250 \text{mA}, V_{CE} = 2V$	40		160		
			$I_C = 250 \text{mA}, I_B = 25 \text{mA}$			0.6		
Collector-Emitter Saturation Voltage		V <sub>CE(sat)</sub> 1	$I_C = 500 \text{mA}, I_B = 50 \text{mA}$			1.0	,,	
			I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 200mA			2.0	V	
Base Emitter on Voltage		$V_{BE(ON)}$	$I_C = 250 \text{mA}, V_{CE} = 2V$	-		1.0		
SMALL SIGNAL CHARACT	ERISTICS	•			I.			
Small Signal Current Gain		h <sub>fe</sub>	$I_C$ = 200mA, $V_{CE}$ = 1.5V, f = 1MHz	20		-		
Out-Put Capacitance		C <sub>ob</sub>	V <sub>CB</sub> =20V, I <sub>E</sub> =0, f = 1MHz			50	pF	
Transistors Frequency		ft	$I_C = 100$ mA, $V_{CE} = 10$ V, $f = 10$ MHz	30			MHz	

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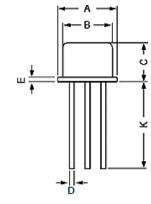
#### **Notes**

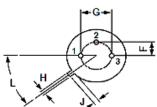
1. Pulse Width  $\leq$  380us,  $\delta \leq$  2%



### **PACKAGE DETAILS**

TO-39 Metal Can Package





DIM	MIN	MAX	
Α	8.50	9.39	
В	7.74	8.50	
С	6.09	6.60	
D	0.40	0.53	
Е		0.88	
F	2.41	2.66	
G	4.82	5.33	
Н	0.71	1.86	
J	0.73	1.02	
K	12.70		
L	42°		

All Dimension are in mm

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### **PIN CONFIGURATION**

- 1. EMITTER
- 2. BASE
- 3. COLLECTOR



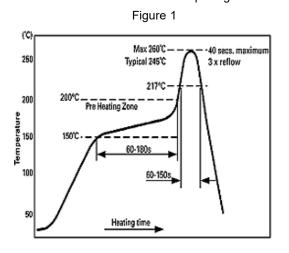


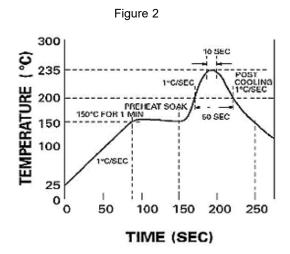
### **Recommended Reflow Solder Profiles**

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder or for devices with leaded terminal plating used with leaded solder.





### Reflow profiles in tabular form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat		
– Temperature Range	150-170°C	150-200°C
– Time	60-180 seconds	60-180 seconds
Time maintained above:		
<ul><li>Temperature</li></ul>	200°C	217°C
– Time	30-50 seconds	60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of the actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

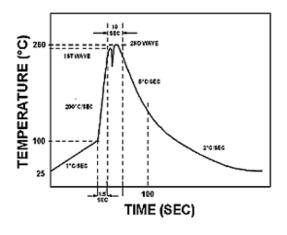
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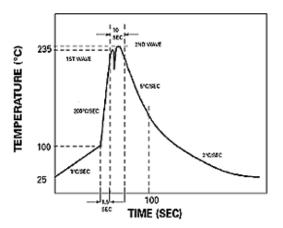


#### **Recommended Wave Solder Profiles**

The Recommended solder Profile for Devices with Pb-free terminal plating where a Pb-free solder is used

The Recommended solder Profile for Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder





#### **Wave Profiles in Tabular Form**

Profile Feature	Sn-Pb System	Pb-free System		
Average Ramp-Up Rate	~200°C/second	~200°C/second		
The heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec		
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp		
Peak Temperature	235°C	260°C max.		
Time within +0 -5°C of the actual Peak	10 seconds	10 seconds		
Ramp-Down Rate	5°C/second max.	5°C/second max.		

### Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by Multicomp Pro.

- · Temperature 5 °C to 30 °C
- · Humidity between 40 to 70 %RH
- · Air should be clean.
- · Avoid harmful gas or dust.
- $\cdot$  Avoid outdoor exposure or storage in areas subject to rain or water spraying.
- · Avoid storage in areas subject to corrosive gas or dust. The product shall not be stored in areas exposed to direct sunlight.
- · Avoid rapid temperature changes.
- · Avoid condensation.
- · Mechanical stress such as vibration and impact shall be avoided.





- · The product shall not be placed directly on the floor.
- · The product shall be stored in a plain area. They should not be turned upside down. They should not be placed against the wall.

#### **Shelf Life**

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period, which is defined as 2 years.

If products are stored longer than the shelf life of 2 years, the products shall be subjected to quality.

### Floor Life the Products and MSL Level

The floor life will start when the products are opened from the original packing.

For this, the following JEDEC table may be referred:

JEDEC MSL Level			
Level	Time	Condition	
1	Unlimited	≤30 °C / 85% RH	
2	1 Year	≤30 °C / 60% RH	
2a	4 Weeks	≤30 °C / 60% RH	
3	168 Hours	≤30 °C / 60% RH	
4	72 Hours	≤30 °C / 60% RH	
5	48 Hours	≤30 °C / 60% RH	
5a	24 Hours	≤30 °C / 60% RH	
6	Time on Label (TOL)	≤30 °C / 60% RH	

### **Part Number Table**

Description	Part Number
Transistor, PNP, 1A, 100V, TO-39	2N5679
Transistor, PNP, 1A, 120V, TO-39	2N5680
Transistor, NPN, 1A, 100V, TO-39	2N5681
Transistor, NPN, 1A, 120V, TO-39	2N5682

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