MJD42C-Q

100 V, 6 A PNP high power bipolar transistor

8 June 2021 Product data sheet

1. General description

PNP high power bipolar transistor in a power DPAK, TO-252 (SOT428C) Surface-Mounted Device (SMD) plastic package.

NPN complement: MJD41C-Q

2. Features and benefits

- High thermal power dissipation capability
- High energy efficiency due to less heat generation
- Electrically similar to popular MJD42 series
- Low collector emitter saturation voltage
- Fast switching speeds
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Power management
- Load switch
- Linear mode voltage regulator
- Constant current drive backlighting application
- Motor drive
- Relay replacement

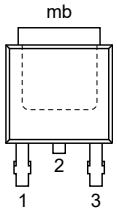
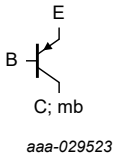
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-100	V
I_C	collector current			-	-	-6	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	-10	A
h_{FE}	DC current gain	V_{CE} = -4 V; I_C = -0.3 A; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		30	-	-	
		V_{CE} = -4 V; I_C = -3 A; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		15	-	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 DPAK (SOT428C)	
2	C	collector		
3	E	emitter		
mb	C	mounting base; connected to collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MJD42C-Q	DPAK	Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428C

7. Marking

Table 4. Marking codes

Type number	Marking code
MJD42C-Q	MJD42CA

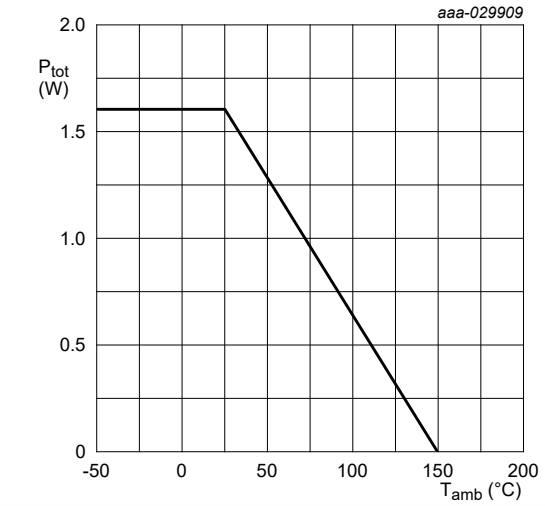
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-100	V
V_{EBO}	emitter-base voltage	open collector		-	-6	V
I_C	collector current			-	-6	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-10	A
P_{tot}	total power dissipation	$T_{mb} \leq 25$ °C	[1]	-	15	W
		$T_{amb} \leq 25$ °C	[2]	-	1.6	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Total power dissipation junction to mounting base.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated mounting pad for collector 1 cm^2.



FR4 PCB, single-sided 70 µm copper, tin-plated, mounting pad for collector 1 cm^2.

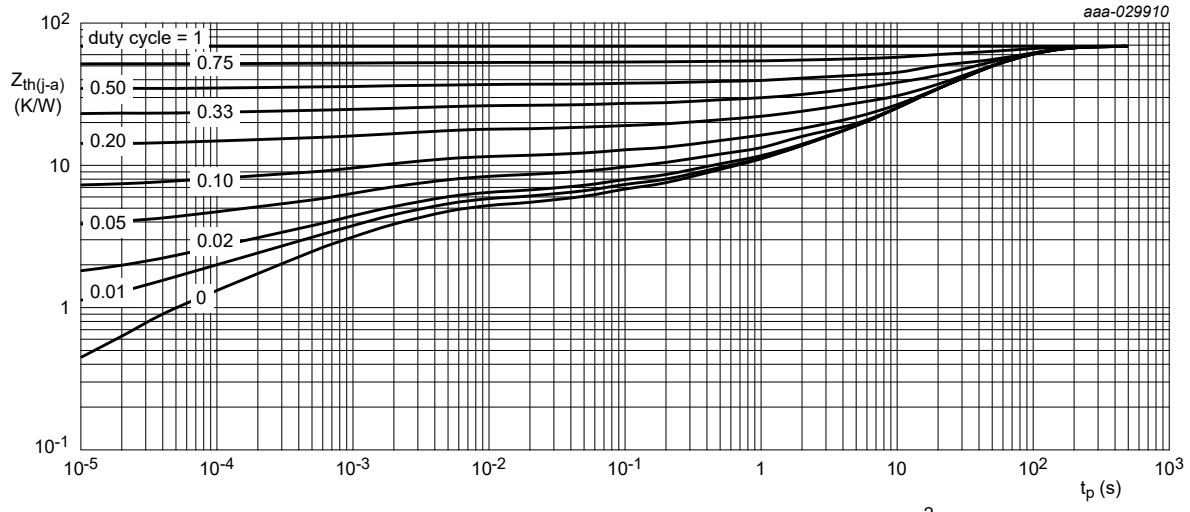
Fig. 1. Power derating curves SOT428C

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	79	K/W
$R_{th(j-mb)}$	thermal resistance from junction to mounting base			-	-	9	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided 70 µm copper, tin-plated mounting pad for collector 1 cm^2.



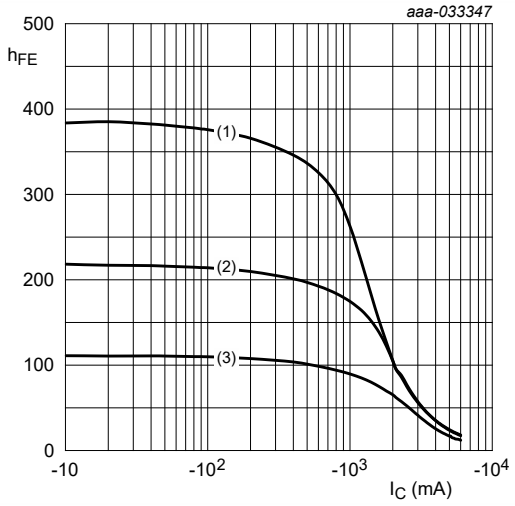
FR4 PCB, single-sided 70 µm copper, tin-plated, mounting pad for collector 1 cm^2.

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

10. Characteristics

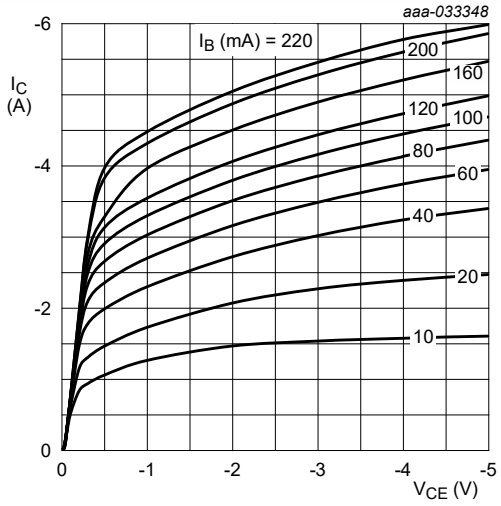
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CES}	collector-emitter cut-off current	V_{CE} = -80 V; V_{BE} = 0 V; T_{amb} = 25 °C		-	-	-1	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-1	µA
h_{FE}	DC current gain	V_{CE} = -4 V; I_C = -0.3 A; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		30	-	-	
		V_{CE} = -4 V; I_C = -3 A; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		15	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -6 A; I_B = -600 mA; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	-1.5	V
V_{BE}	base-emitter voltage	V_{CE} = -4 V; I_C = -6 A; pulsed; $t_p \leq$ 200 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	-2	V
h_{fe}	small-signal current gain	V_{CE} = -10 V; I_C = -500 mA; f = 1 kHz; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		20	-	-	
f_T	transition frequency	V_{CE} = -10 V; I_C = -500 mA; f = 100 MHz; T_{amb} = 25 °C		3	-	-	MHz



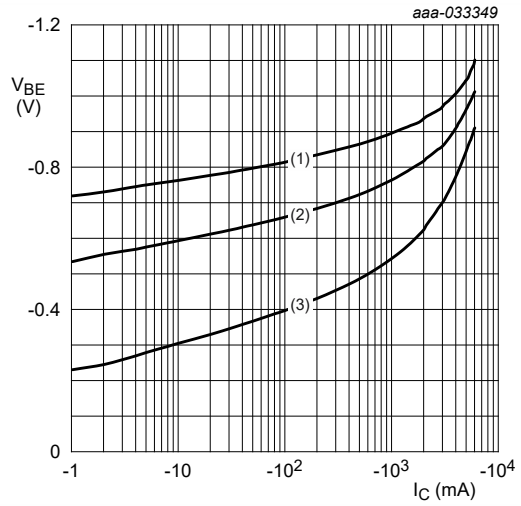
V_{CE} = -2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 3. DC current gain as a function of collector current; typical values



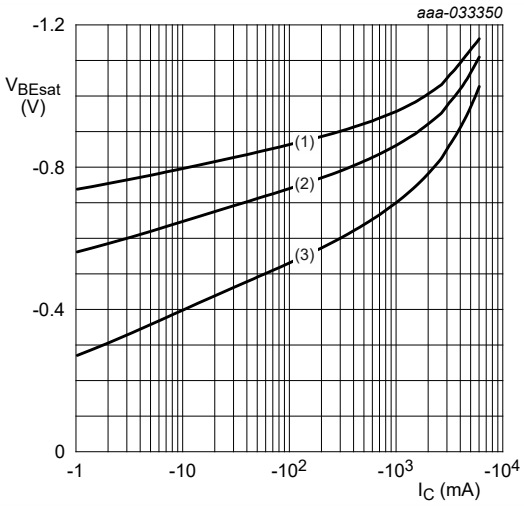
T_{amb} = 25 °C

Fig. 4. Collector current as a function of collector-emitter voltage; typical values



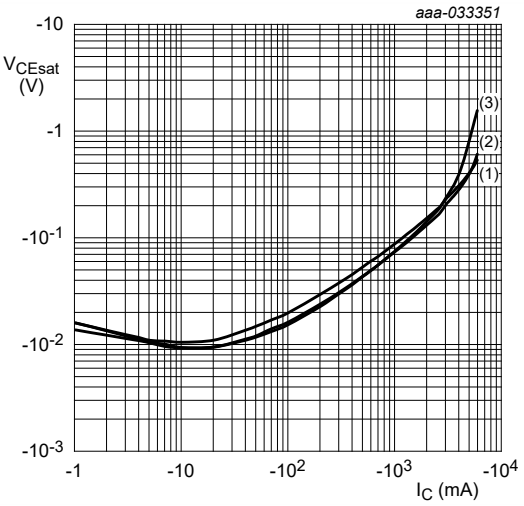
V_{CE} = -4 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 5. Base-emitter voltage as a function of collector current; typical values



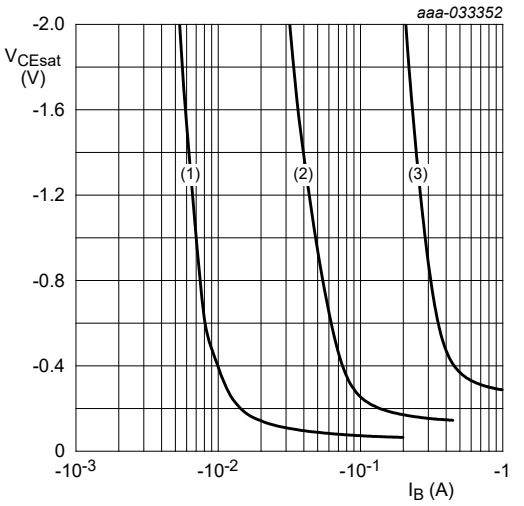
I_C/I_B = 10
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



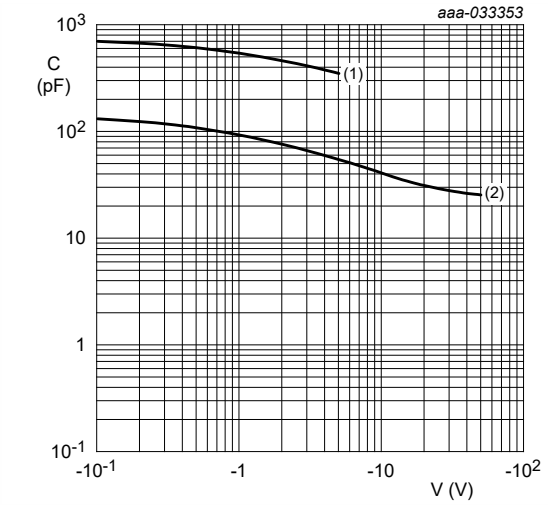
I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_C = -1 A
(2) I_C = -2.5 A
(3) I_C = -5 A

Fig. 8. Collector-emitter saturation region as a function of base current; typical values



T_{amb} = 25 °C
(1) C_e
(2) C_c

Fig. 9. Input/output capacitance as a function of input/output voltage

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.

12. Package outline

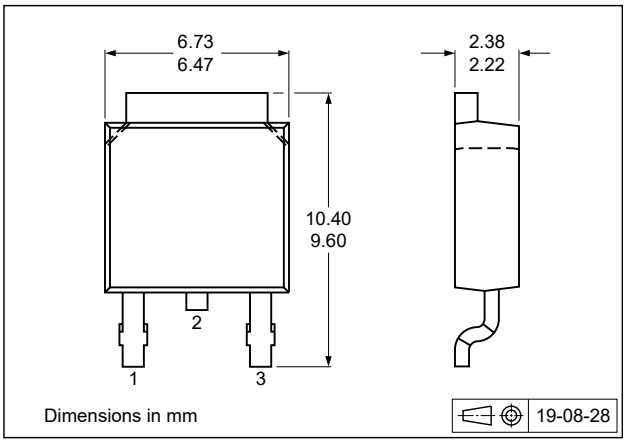


Fig. 10. Package outline DPAK (SOT428C)

13. Soldering

Footprint information for reflow soldering of DPAK (SOT428C) package **SOT428C**

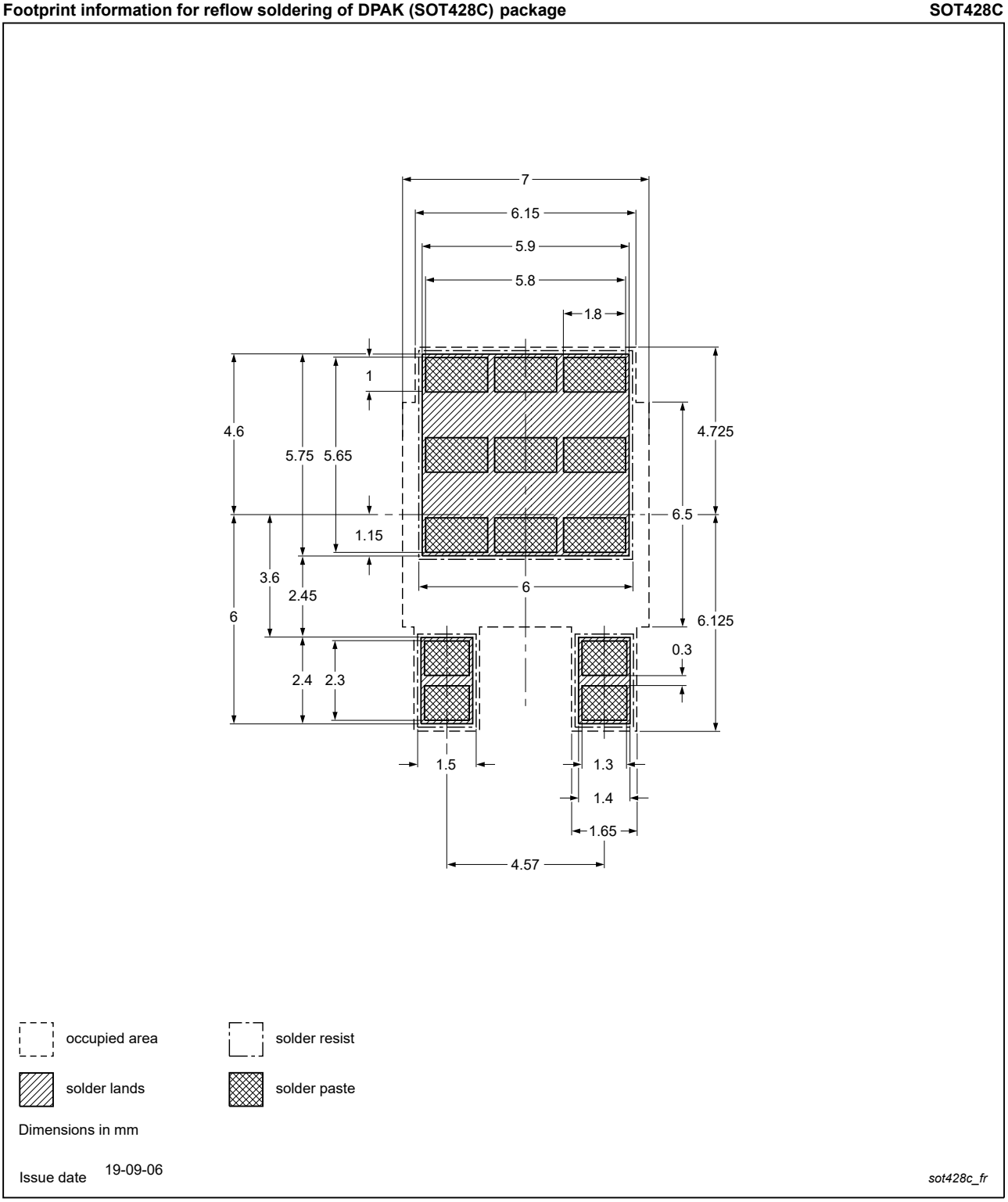


Fig. 11. Reflow soldering footprint for DPAK (SOT428C)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MJD42C-Q v.2	20210608	Product data sheet	-	MJD42C-Q v.1
Modifications:	• Product status changed			
MJD42C-Q v.1	20210416	Objective 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".
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