



# MJD44H11A

80 V, 8 A NPN high power bipolar transistor

12 September 2019

Product data sheet

## 1. General description

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

PNP complement: MJD45H11A

## 2. Features and benefits

- High thermal power dissipation capability
- High energy efficiency due to less heat generation
- Electrically similar to popular MJD44H series
- Low collector emitter saturation voltage
- Fast switching speeds
- AEC-Q101 qualified

## 3. Applications

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

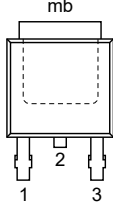
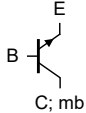
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage		-	-	80	V
$I_C$	collector current		-	-	8	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	16	A
$h_{FE}$	DC current gain	$V_{CE} = 1$ V; $I_C = 2$ A; $T_{amb} = 25$ °C	60	-	-	

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p style="text-align: center;">DPAK (SOT428C)</p>	 <p style="text-align: center;">aaa-029889</p>
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
MJD44H11A	DPAK	Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428C

## 7. Marking

Table 4. Marking codes

Type number	Marking code
MJD44H11A	MJD44H11A

## 8. Limiting values

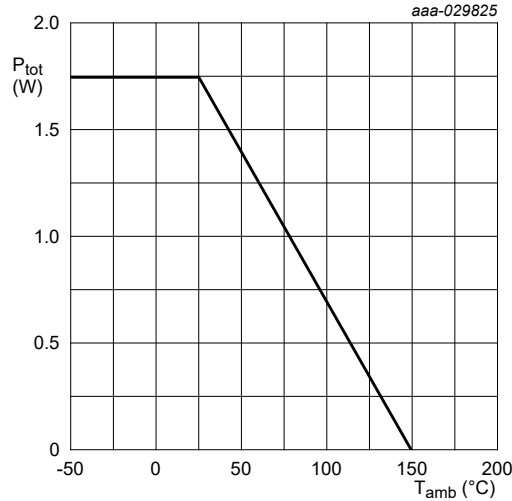
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC601134).

Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CEO}$	collector-emitter voltage		-	80	V	
$V_{EBO}$	emitter-base voltage	open collector	-	6	V	
$I_C$	collector current		-	8	A	
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	16	A	
$P_{tot}$	total power dissipation	$T_{mb} \leq 25$ °C	[1]	-	20	W
		$T_{amb} \leq 25$ °C	[2]	-	1.75	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 copper, tin-plated mounting pad for collector 1 cm<sup>2</sup>.



FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

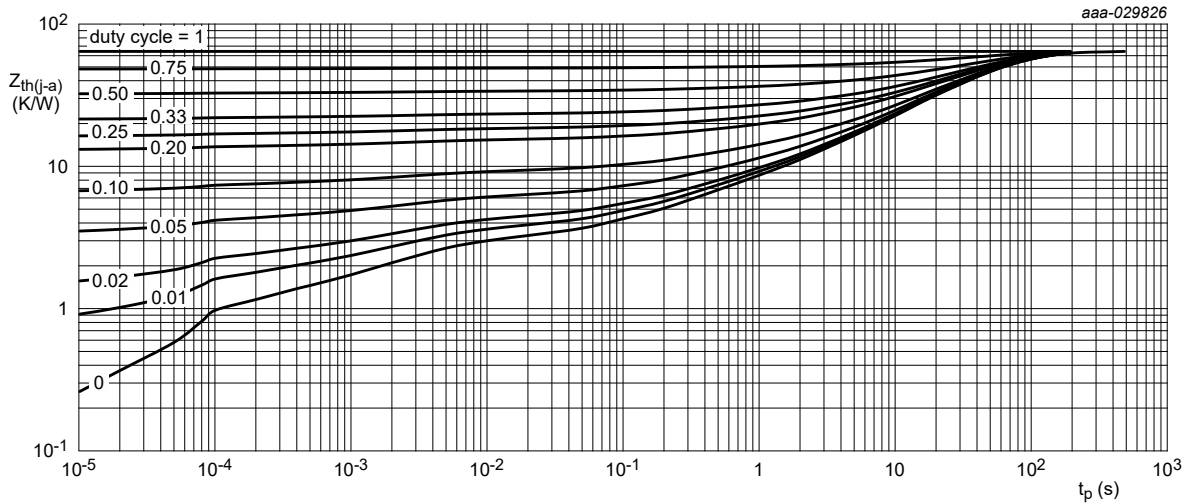
Fig. 1. Power derating curves SOT428C

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	in free air	-	-	6.25	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	[1]	-	-	72	K/W

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



FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

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	$V_{CE} = 64\text{ V}; V_{BE} = 0\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{CE} = 64\text{ V}; V_{BE} = 0\text{ V}; T_j = 150\text{ }^\circ\text{C}$	-	-	50	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	1	$\mu\text{A}$
$h_{FE}$	DC current gain	$V_{CE} = 1\text{ V}; I_C = 2\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	60	-	-	
		$V_{CE} = 1\text{ V}; I_C = 4\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 8\text{ A}; I_B = 400\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	1	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 8\text{ A}; I_B = 800\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	1.5	V
$t_{on}$	turn-on time	$I_C = 5\text{ A}; I_{Bon} = 0.5\text{ mA}; I_{Boff} = -0.5\text{ mA}; V_{CC} = 12.5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	-	300	-	ns
$t_s$	storage time		-	250	-	ns
$t_f$	fall time		-	170	-	ns
$t_{off}$	turn-off time		-	420	-	ns
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	30	-	pF
$f_T$	transition frequency	$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	160	-	MHz

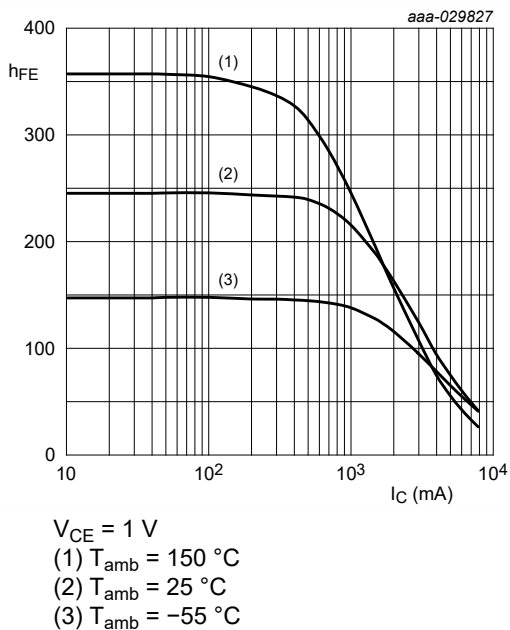


Fig. 3. DC current gain as a function of collector current; typical values

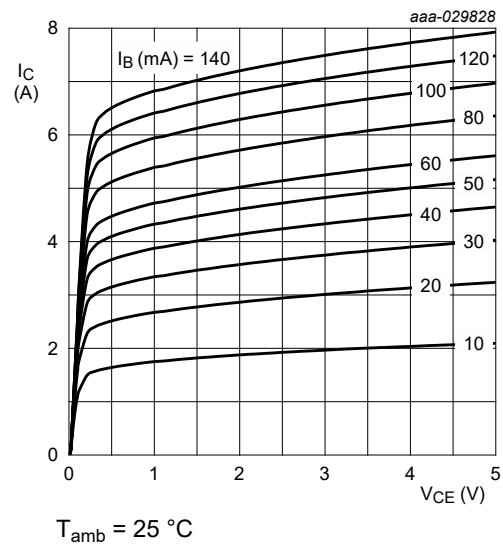
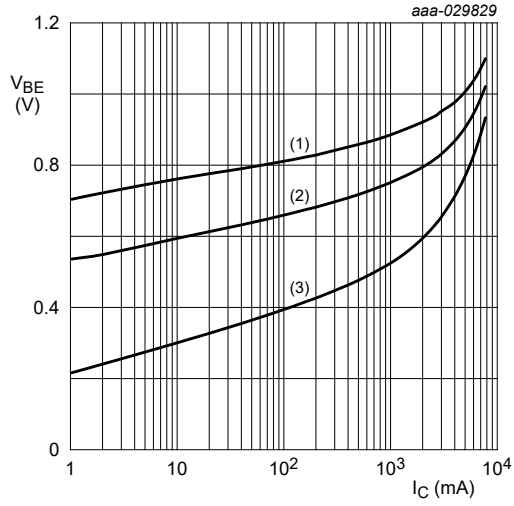
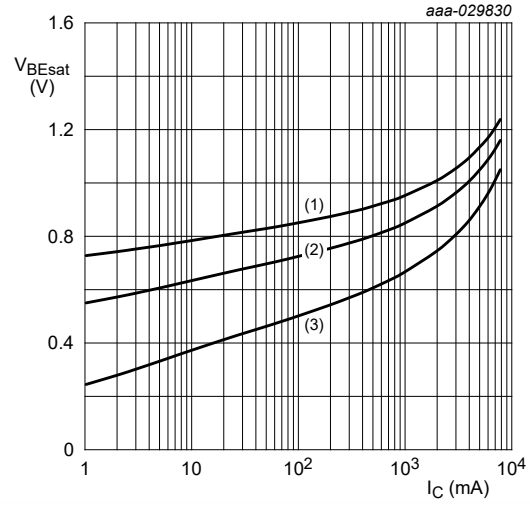


Fig. 4. Collector current as a function of collector-emitter voltage; typical values



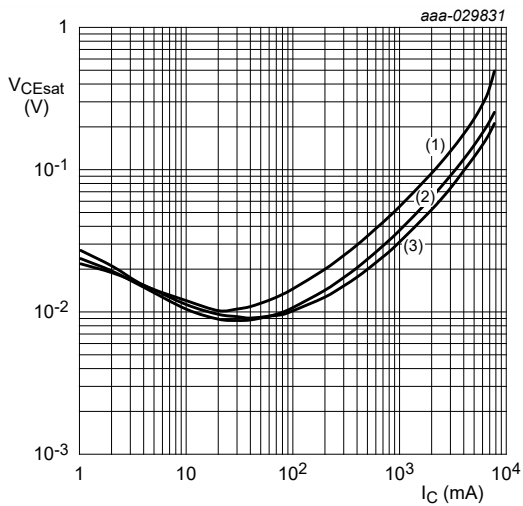
$V_{CE} = 5 \text{ V}$   
 (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150 \text{ }^\circ\text{C}$

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



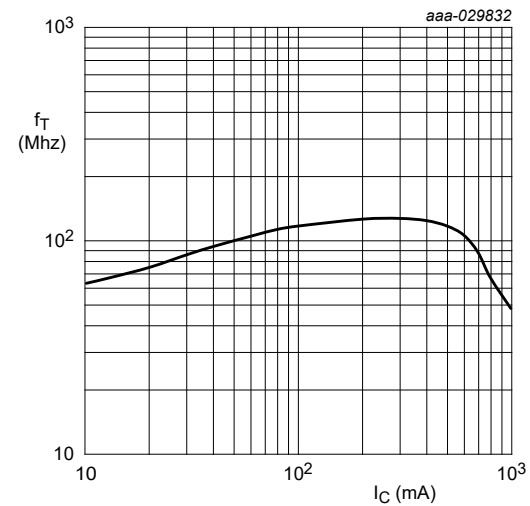
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150 \text{ }^\circ\text{C}$

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



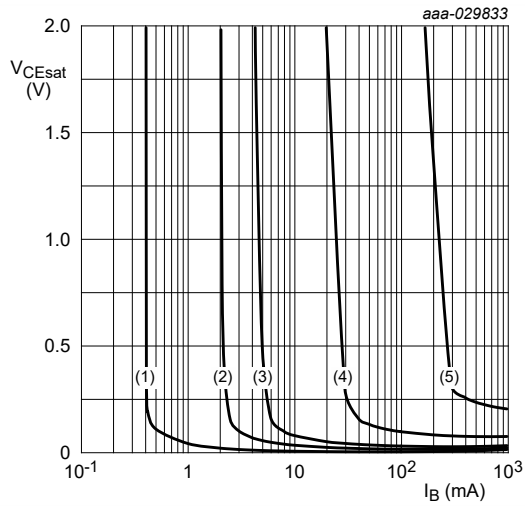
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^\circ\text{C}$

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



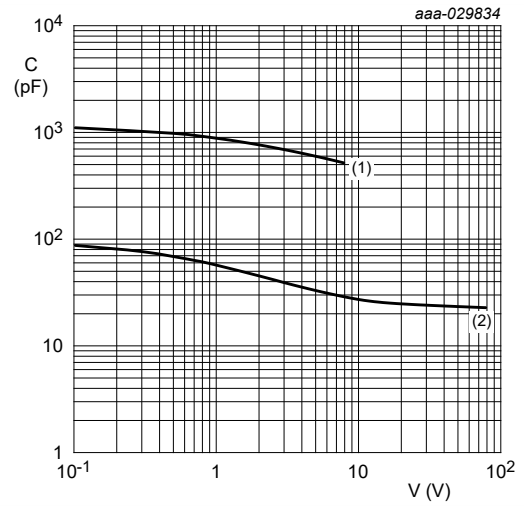
$V_{CE} = 2 \text{ V}$   
 $T_{amb} = 25 \text{ }^\circ\text{C}$

**Fig. 8. Transition frequency as a function of collector current; typical values**



- (1)  $I_C = 100$  mA
- (2)  $I_C = 500$  mA
- (3)  $I_C = 1000$  mA
- (4)  $I_C = 3000$  mA
- (5)  $I_C = 8000$  mA

Fig. 9. Collector-emitter saturation region as a function of base current; typical values



- $T_{amb} = 25$  °C
- (1)  $C_e$
  - (2)  $C_c$

Fig. 10. Input/output capacitance as a function of input/output voltage

### 11. Test information

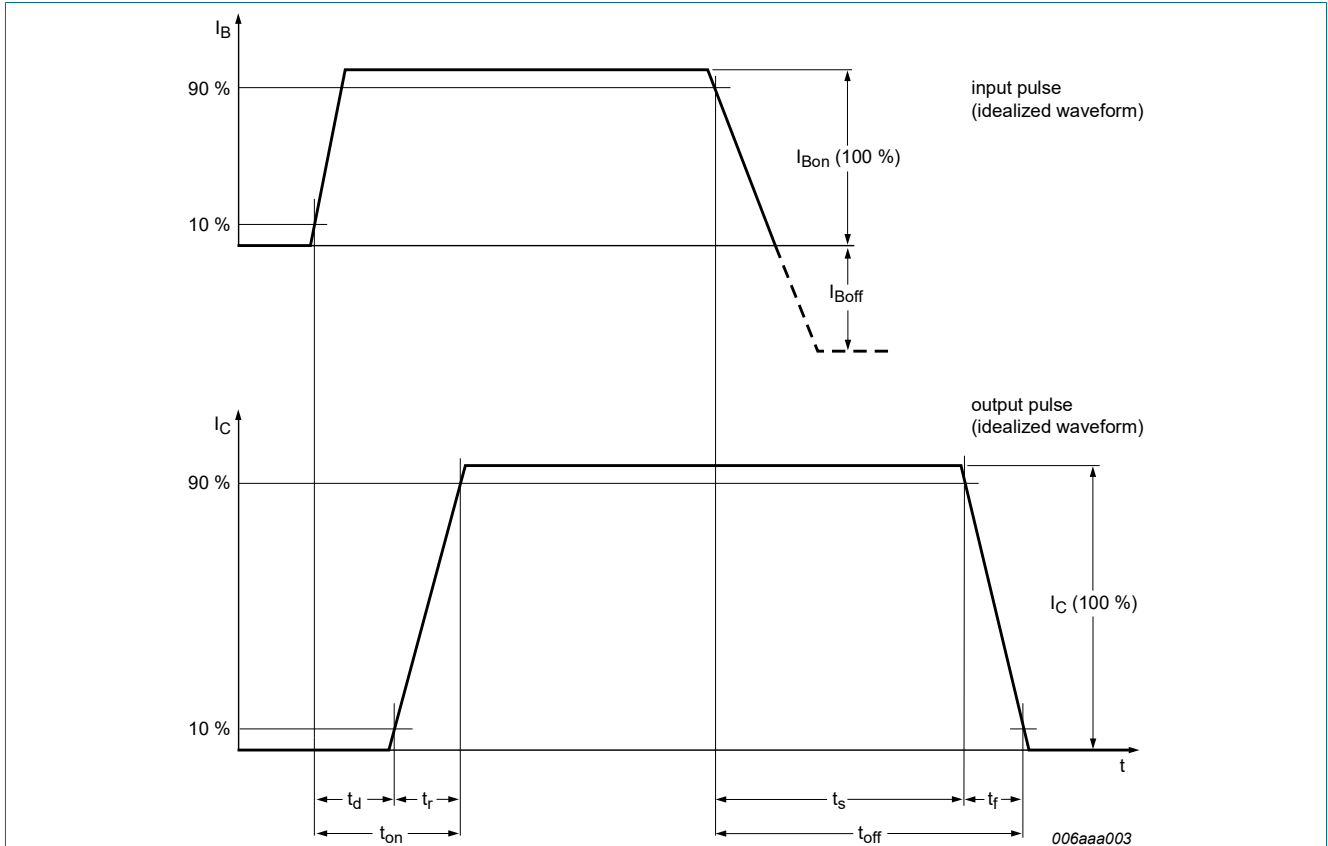


Fig. 11. BISS transistor switching time definition

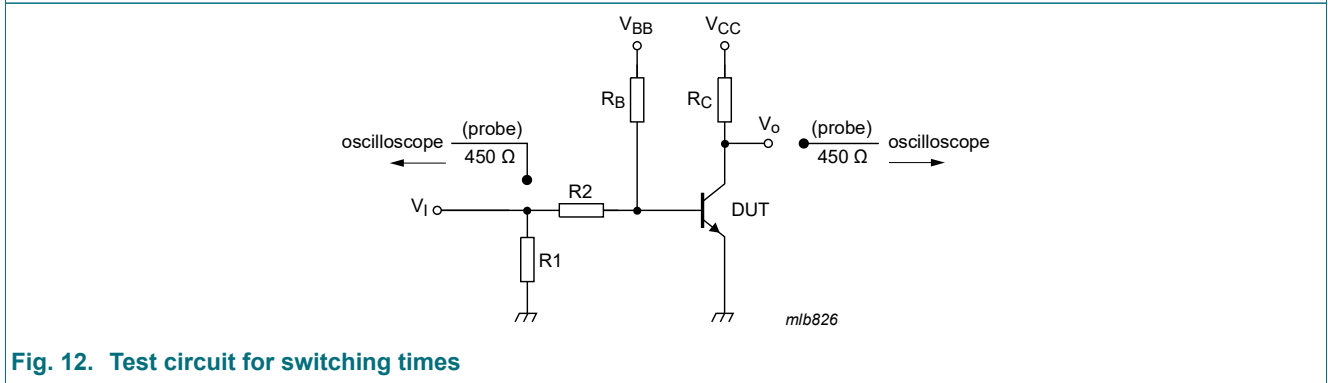


Fig. 12. Test circuit for switching times

### 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

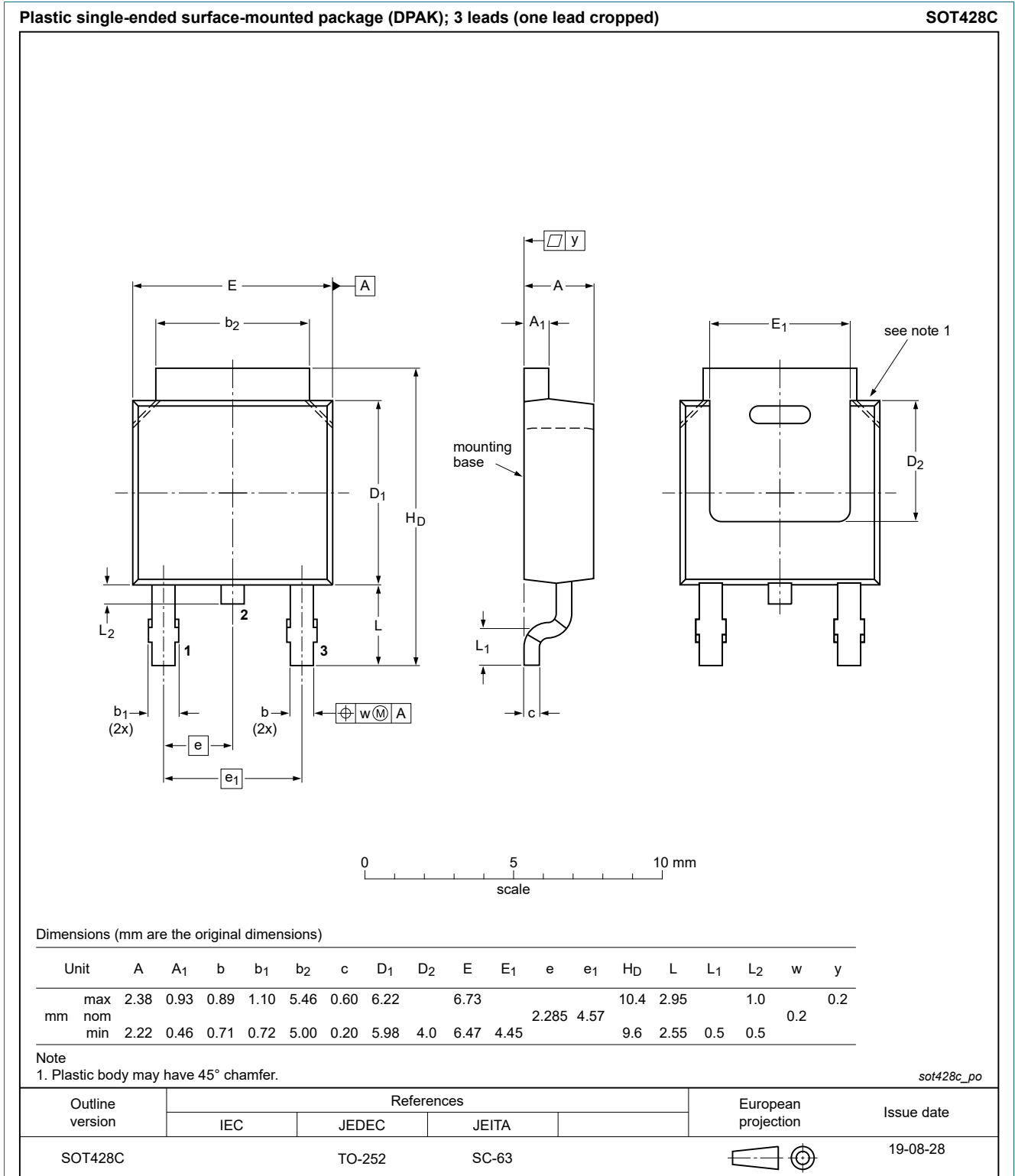


Fig. 13. Package outline DPAK (SOT428C)



### 13. Soldering

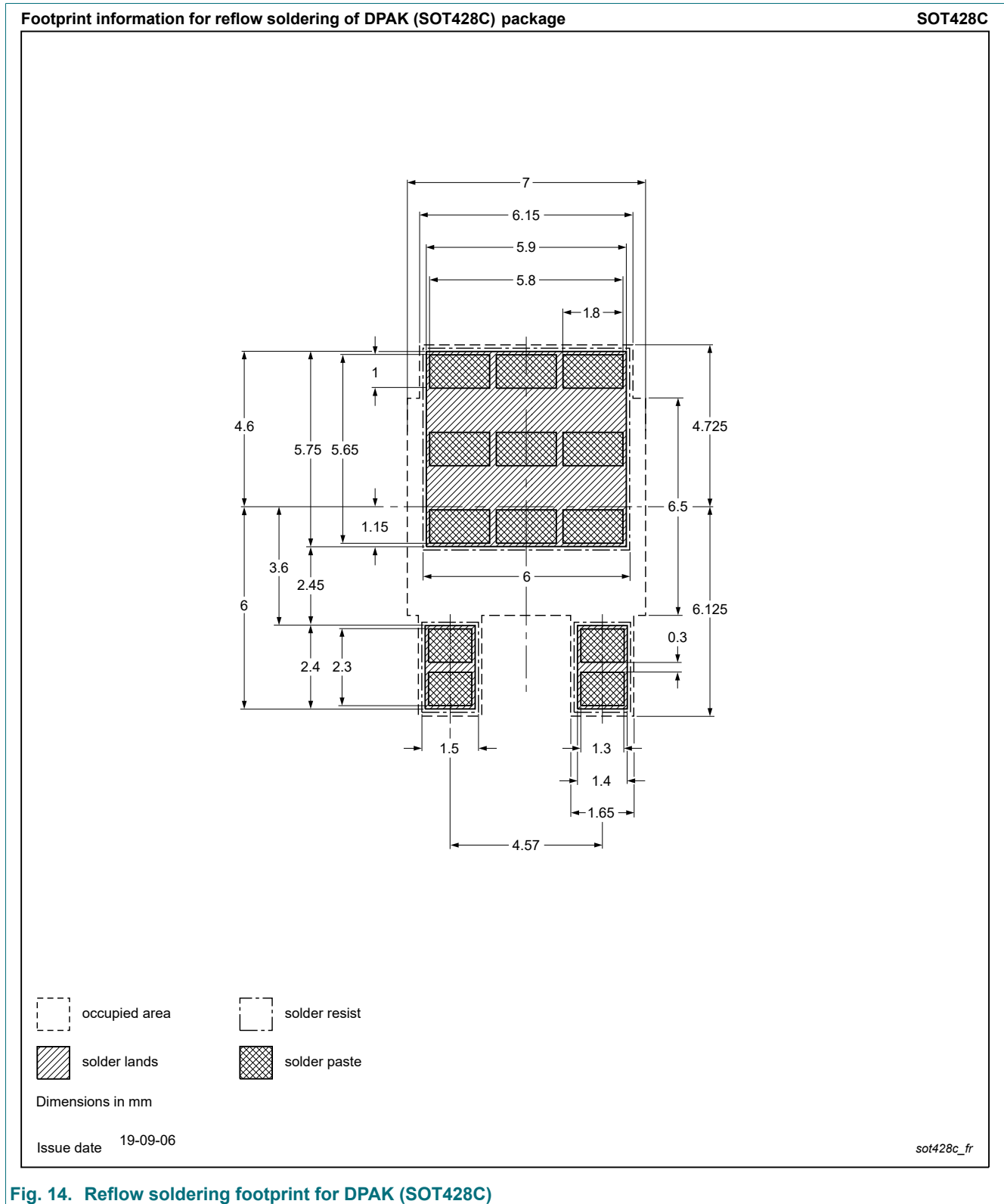


Fig. 14. Reflow soldering footprint for DPAK (SOT428C)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MJD44H11A v.3	20190912	Product data sheet	-	MJD44H11A v.2
Modifications:	• Package outline adapted to SOT428C			
MJD44H11A v.2	20190729	Product data sheet	-	MJD44H11A v.1
MJD44H11A v.1	20190528	Preliminary 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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