



BCP54-Q series

45 V, 1 A NPN medium power transistors

Rev. 1 — 2 May 2022

Product data sheet

1. General description

NPN medium power transistors in a SOT223 (SC-73) flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High collector current capability I_C and I_{CM}
- Three current gain selections
- High power dissipation capability
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Linear voltage regulators
- MOSFET drivers
- Low-side switches
- Battery-driven devices
- Power management
- Amplifiers

4. Quick reference data

Table 1. Quick reference data

$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

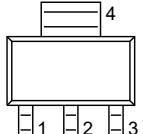
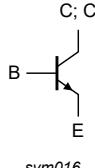
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1 \text{ ms}$	-	-	2	A
h_{FE}	DC current gain	$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}$	[1]	63	-	250
	BCP54-Q		[1]	63	-	160
	BCP54-10-Q		[1]	100	-	250
	BCP54-16-Q					

[1] pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$

nexperia

5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BCP54-Q	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	SOT223
BCP54-10-Q			
BCP54-16-Q			

7. Marking

Table 4. Marking

Type number	Marking code
BCP54-Q	BCP54
BCP54-10-Q	BCP54/10
BCP54-16-Q	BCP54/16

8. Limiting values

Table 5. Limiting values

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

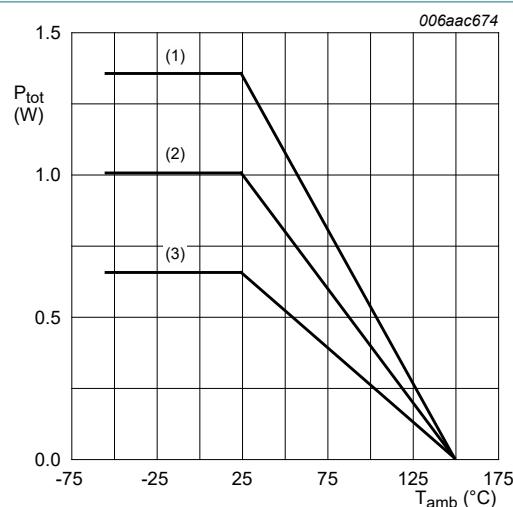
$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	45	V
V_{CEO}	collector-emitter voltage	open base	-	45	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I_C	collector current		-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	2	A
I_B	base current		-	0.3	A
I_{BM}	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	0.3	A
P_{tot}	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	[1]	-	0.65 W
			[2]	-	1.00 W
			[3]	-	1.35 W
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	150	°C
T_{stg}	storage temperature		-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.

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

[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 cm^2 .



(1) FR4 PCB, mounting pad for collector 6 cm^2

(2) FR4 PCB, mounting pad for collector 1 cm^2

(3) FR4 PCB, standard footprint

Fig. 1. Power derating curves SOT223

9. Thermal characteristics

Table 6. Thermal characteristics

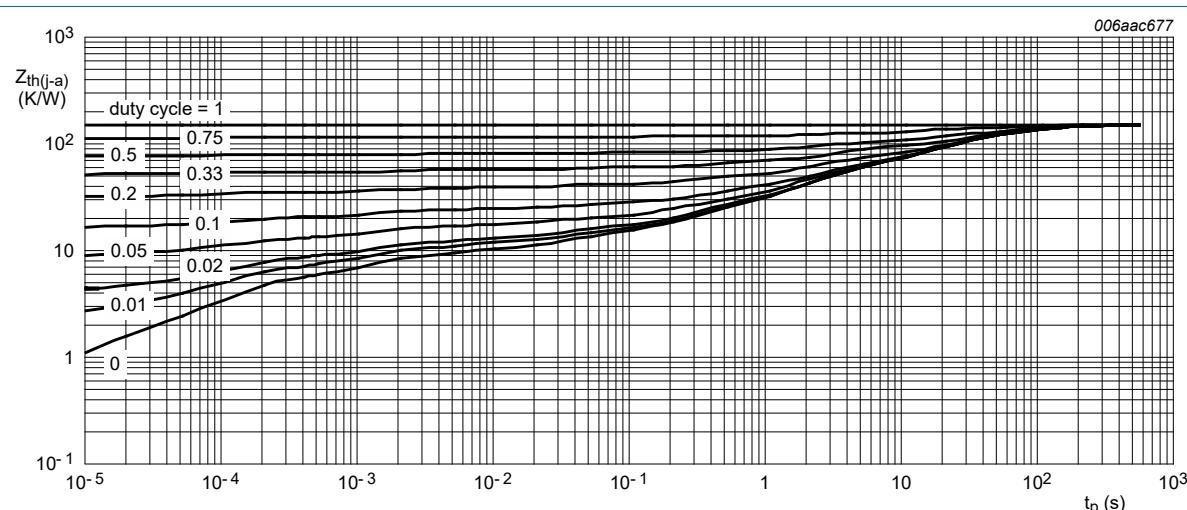
$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	195	K/W
			[2]			125	K/W
			[3]			93	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

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

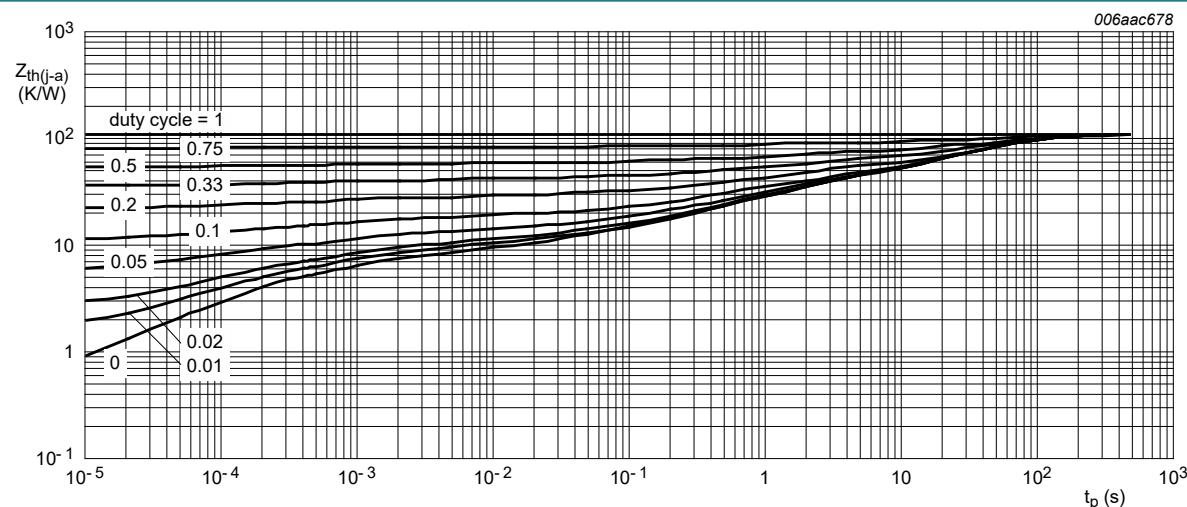
[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm^2 .

[3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm^2 .



FR4 PCB; single-sided copper; tin-plated and standard footprint

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



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm^2

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

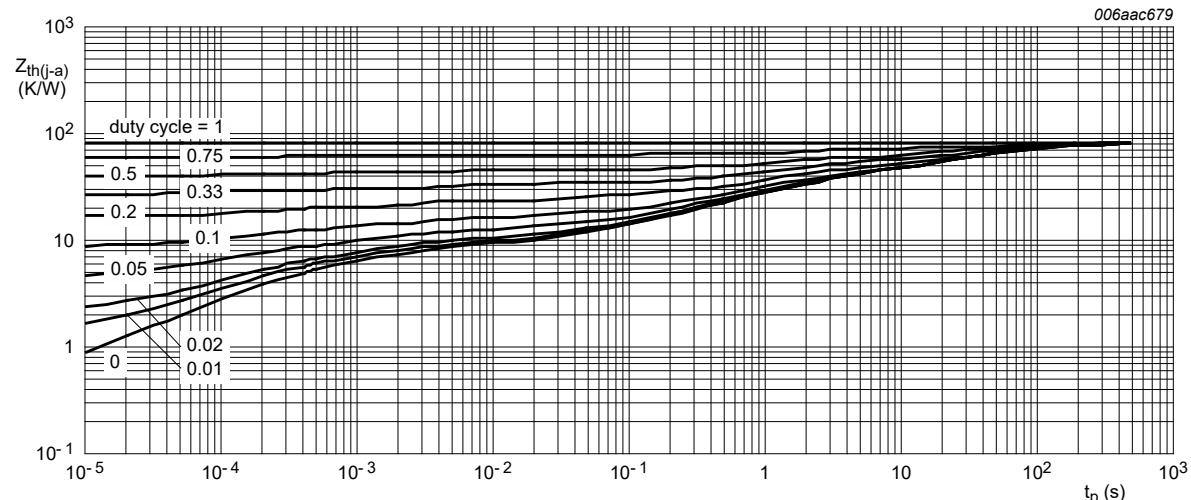


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0 \text{ A}$		45	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2 \text{ mA}; I_B = 0 \text{ A}$		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100 \mu\text{A}; I_C = 0 \text{ A}$		5	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}$		-	-	100	nA
		$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_J = 150^\circ\text{C}$		-	-	10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}$		-	-	100	nA
h_{FE}	DC current gain						
	BCP54-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}$		63	-	250	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}$		40	-	-	
	BCP54-10-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}$		63	-	160	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}$		40	-	-	
	BCP54-16-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}$		100	-	250	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}$		40	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}$	[1]	-	-	0.5	V
V_{BE}	base-emitter voltage	$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}$	[1]	-	-	1	V
C_c	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = i_e = 0 \text{ A}; f = 1 \text{ MHz}$		-	6	-	pF
f_T	transition frequency	$V_{CE} = 5 \text{ V}; I_C = 50 \text{ mA}; f = 100 \text{ MHz}$		100	180	-	MHz

[1] pulsed; $t_p \leq 300 \mu\text{s}; \delta \leq 0.02$

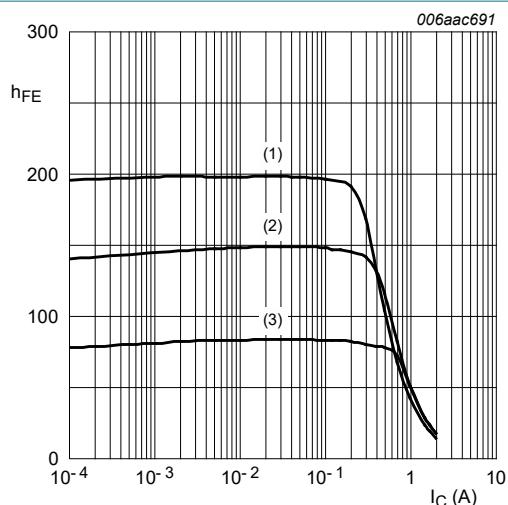


Fig. 5. DC current gain as a function of collector current; typical values

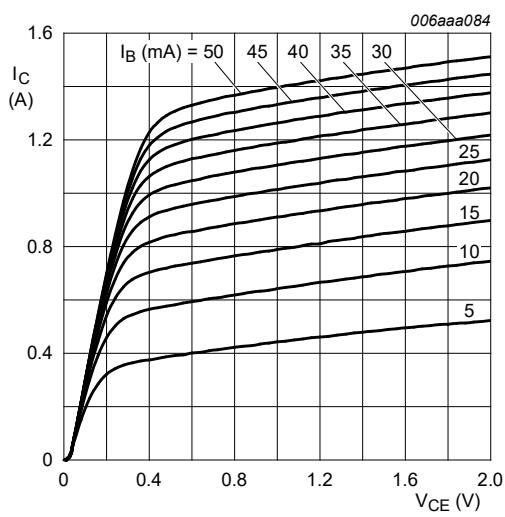


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

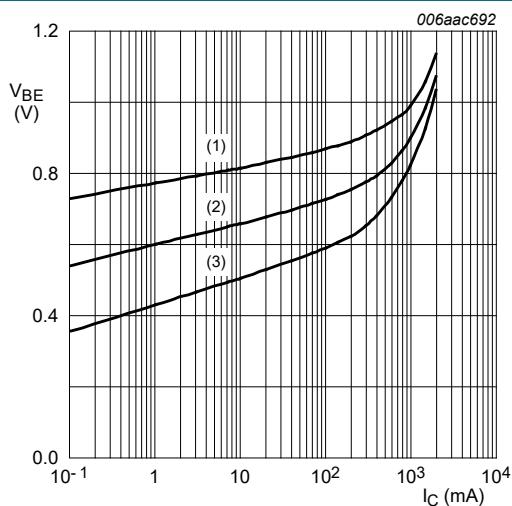


Fig. 7. Base-emitter voltage as a function of collector current; typical values

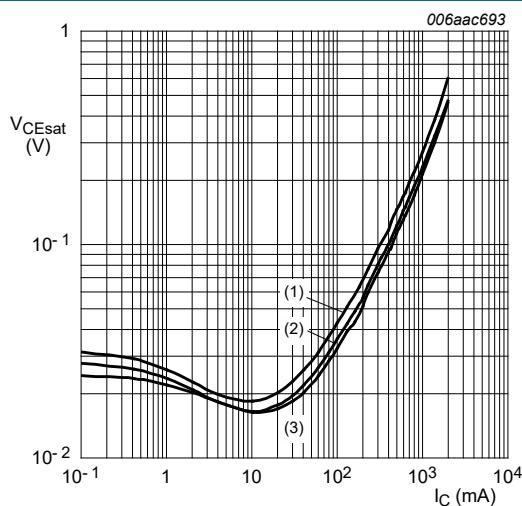


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

11.1. 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

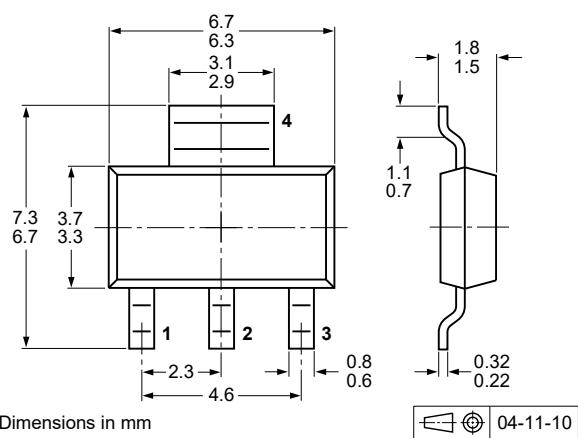


Fig. 9. Package outline SOT223 (SC-73)

13. Soldering

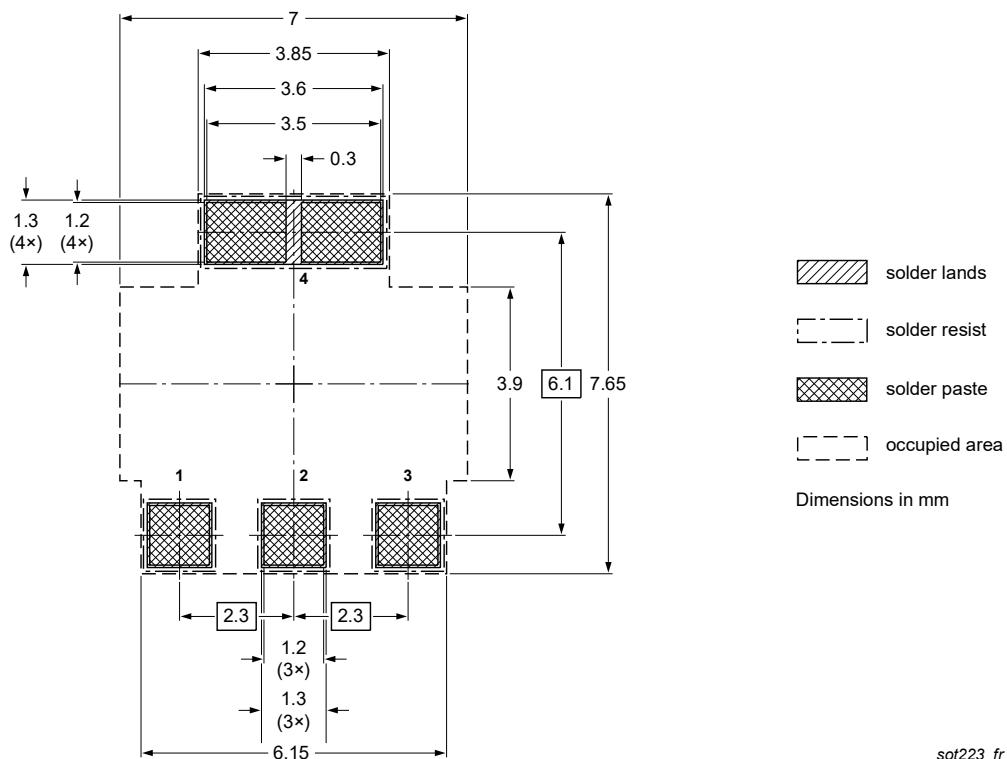


Fig. 10. Reflow soldering footprint for SOT223 (SC-73)

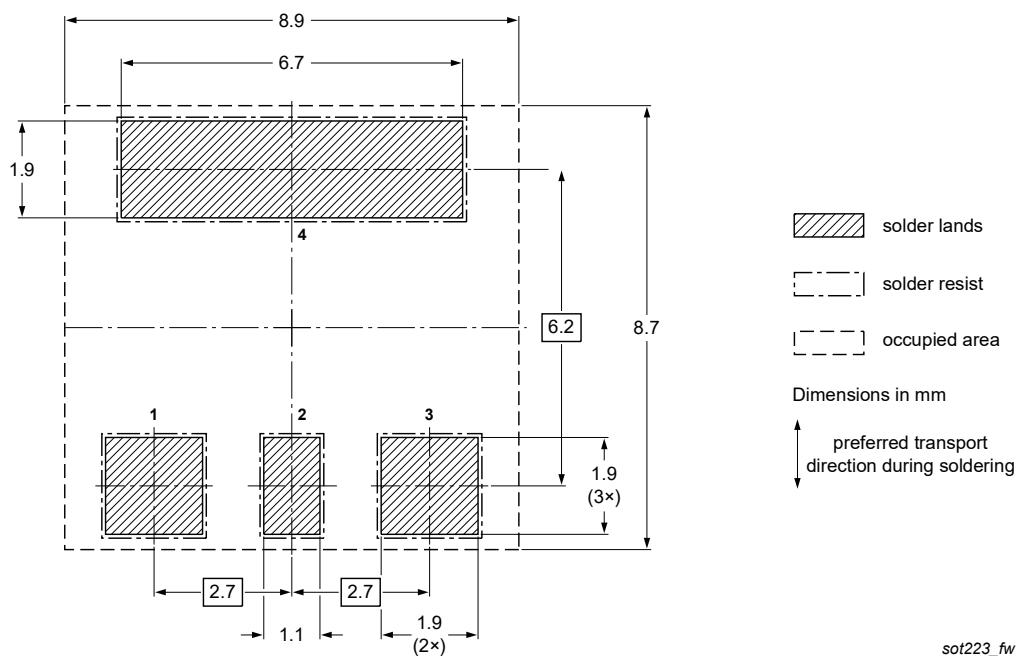


Fig. 11. Wave soldering footprint for SOT223 (SC-73)

14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP54-Q_SER v.1	20220502	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.

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Date of release: 2 May 2022