

## IPAD™ automotive grade integrated protected low pass filter for BroadR Reach™ interface

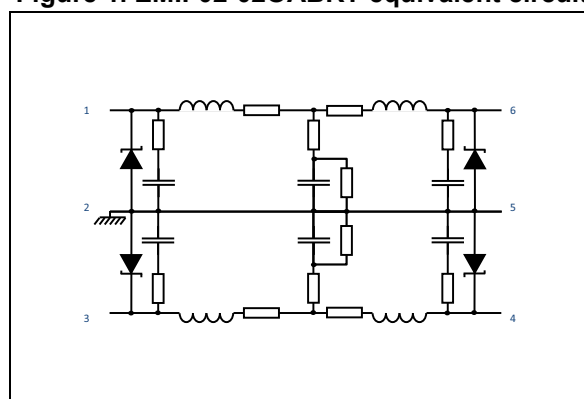
Datasheet - production data



### Description

The EMIF02-02OABRY is a highly integrated solution designed to suppress EMI noise in BroadR Reach™ interfaces in automotive applications. This low pass filter includes a 15 kV ISO10605 protection and is housed in a 3 x 3 mm<sup>2</sup> wettable flanks QFN.

Figure 1. EMIF02-02OABRY equivalent circuit



### Features

- Attenuation profile compliant with BroadR Reach™ requirements from -40 °C to 125 °C
- Return loss ( $S_{dd11}$ ) at 60 MHz: -20 dB
- Components matching: 1% (between line 1 and 2)
- Package:
  - Dimensions: 3.0 x 3.0 mm
  - Pitch: 1.1 μm
  - Wettable flank QFN
- AEC-Q101 compliant

### Complies with the following standards

- ISO 10605 (330 Ω / 330 pF) (pins 1 and 3):
  - 15 kV (air discharge)
  - 15 kV (contact discharge)
- ISO 7637-3 (pins 1 and 3):
  - Pulse 3a: -150 V
  - Pulse 3b: +100 V
- MIL-STD883J (HBM) (pins 4 and 6)
  - ±2 kV

TM: IPAD is a trademark of STMicroelectronics.

# 1 Characteristics

**Table 1. Absolute ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

Symbol	Parameter and test conditions	Value	Unit
$V_{PP}$	External pins (pin 1 and pin 3): IEC 61000-4-2 (330 $\Omega$ / 150 pF) air discharge contact discharge	$\pm 15$ $\pm 15$	kV
	External pins (pin 1 and pin 3): ISO 10605 (330 $\Omega$ / 330 pF) air discharge contact discharge	$\pm 15$ $\pm 15$	
$V_{PP}$	Transceiver side pins: HBM (pin 4 and pin 6)	$\pm 2$	kV
$T_L$	Maximum lead temperature for soldering 10 s	260	$^{\circ}\text{C}$
$T_{op}$	Operating junction temperature range	-40 to +125	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	-55 to +125	$^{\circ}\text{C}$

**Table 2. Electrical characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

Symbol	Conditions	Min.	Typ.	Max.	Unit
$V_{BR}$	Internal protection diode breakdown voltage, $I_R = 20\text{ mA}$	6			V
$V_{CL}$	$I_{PP} = 1\text{ A}$ , 8/20 $\mu\text{s}$		10.5		V
$R_{DC}$	Serial resistance (pins 3 to 4 or 1 to 6)		12		$\Omega$
$S_{dd11}$	From 10 MHz to 60 MHz, $T_j = -40\text{ }^{\circ}\text{C}$ to $125\text{ }^{\circ}\text{C}$			-20	dB
$S_{dd22}$				-20	
$S_{cd21}$ $S_{dc21}$				-50	

**Figure 2. BroadR Reach application schematic**

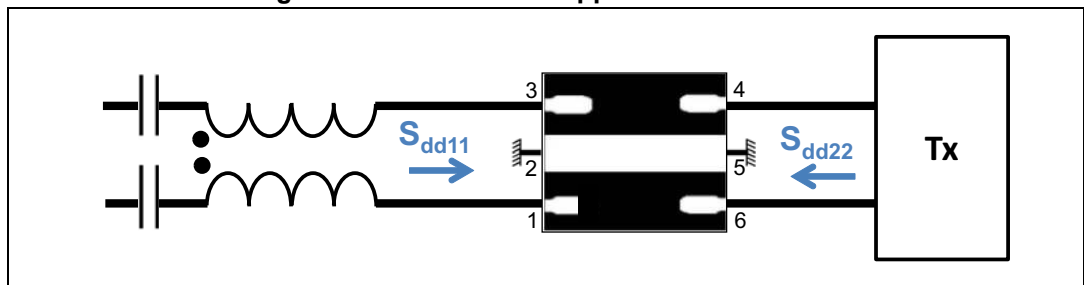


Figure 3.  $S_{dd11}$  differential return loss curve -external pins

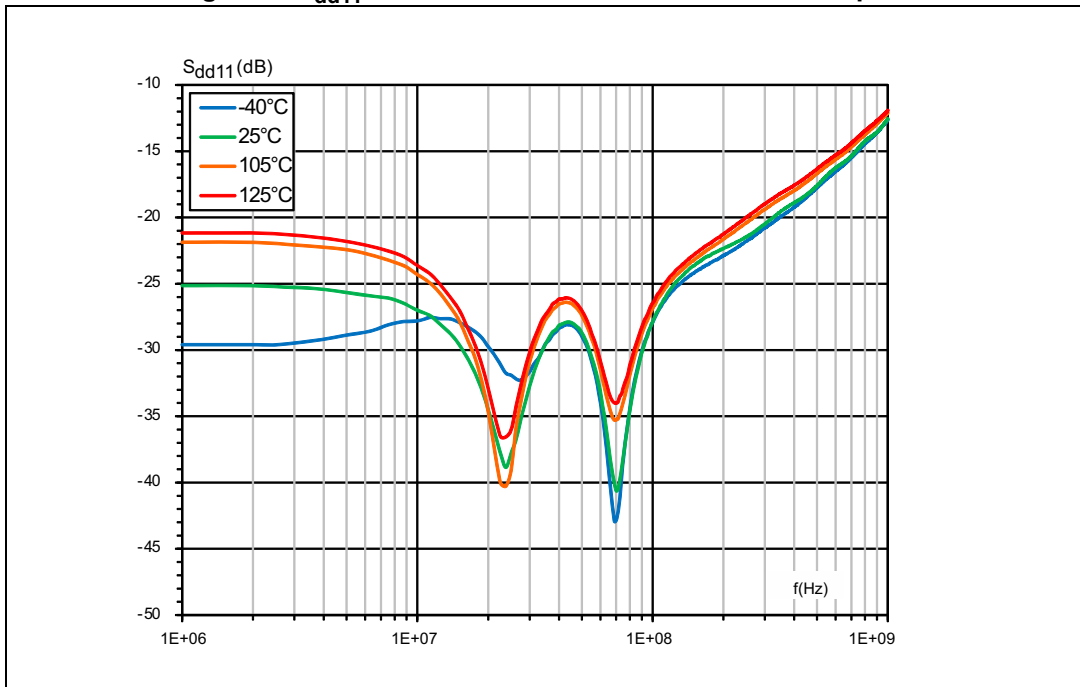


Figure 4.  $S_{dd22}$  differential return loss curve -transceiver side pins

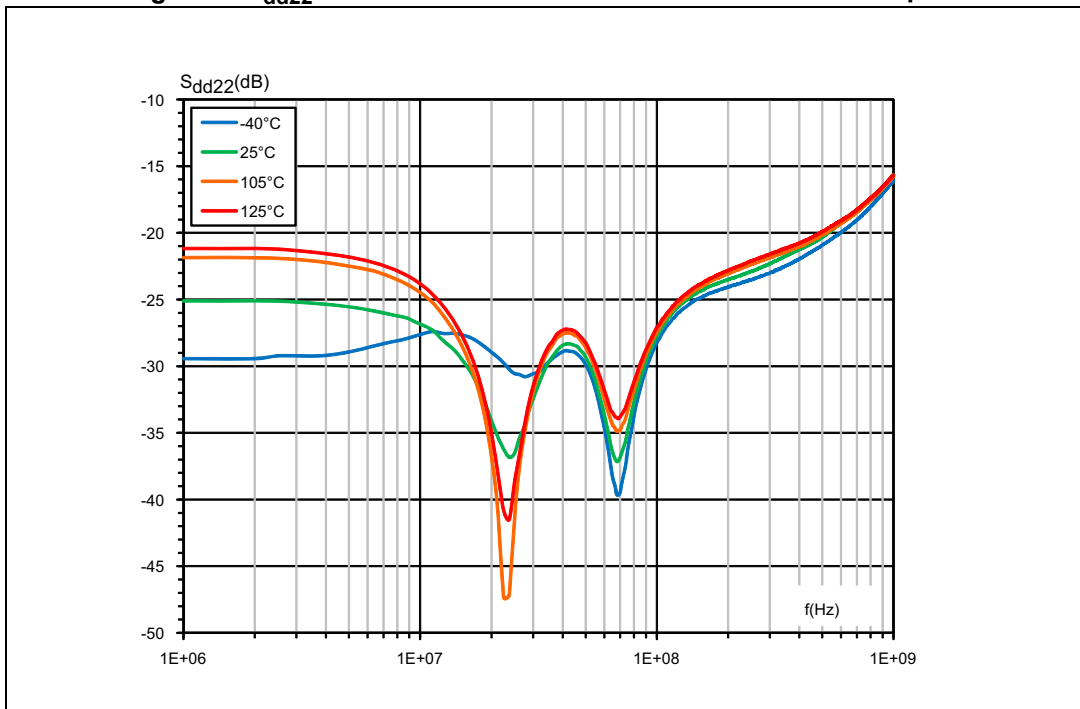


Figure 5.  $S_{dd21}$  attenuation curve

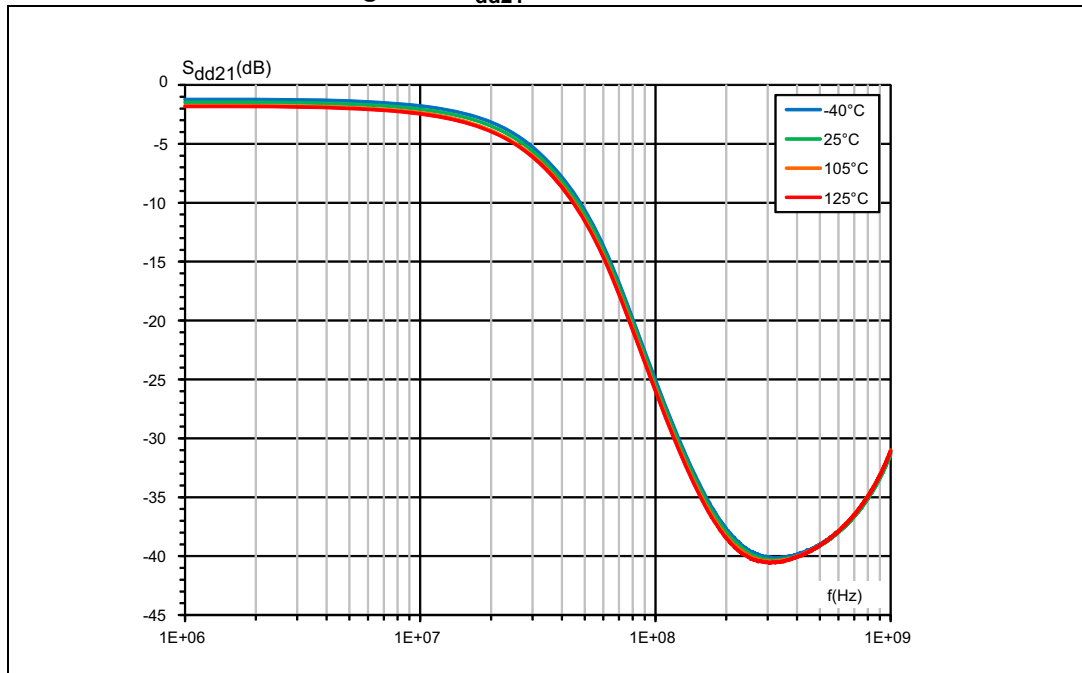


Figure 6. ESD response to ISO 10605-  
C = 330 pF, R = 330  $\Omega$  (+15 kV contact)

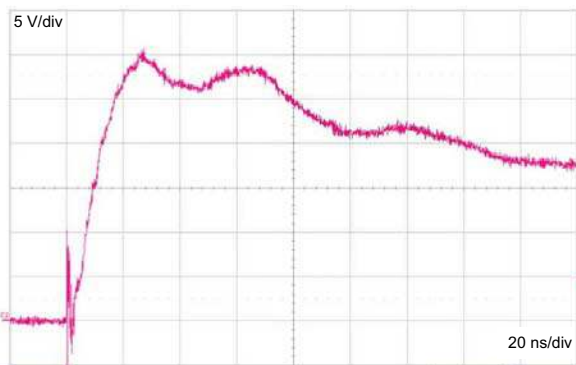
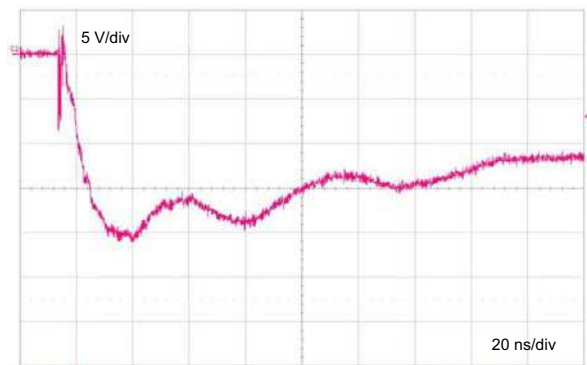
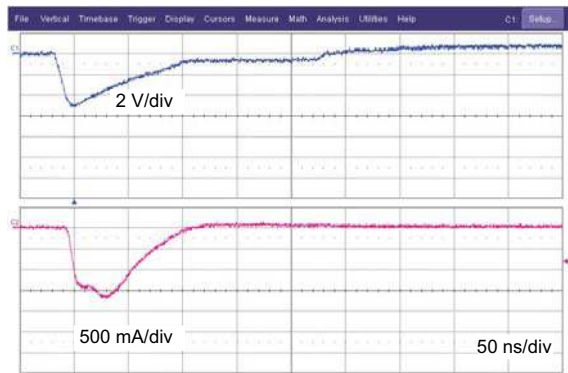


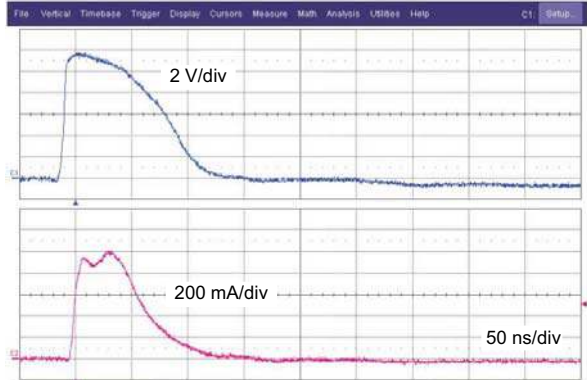
Figure 7. ESD response to ISO 10605-  
C = 330 pF, R = 330  $\Omega$  (-15 kV contact)



**Figure 8. Response to ISO 7637-3 (pulse 3a)**  
**Us = -150 V**



**Figure 9. Response to ISO 7637-3 (pulse 3b)**  
**Us = +100 V**



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 QFN package information

Figure 10. QFN package outline

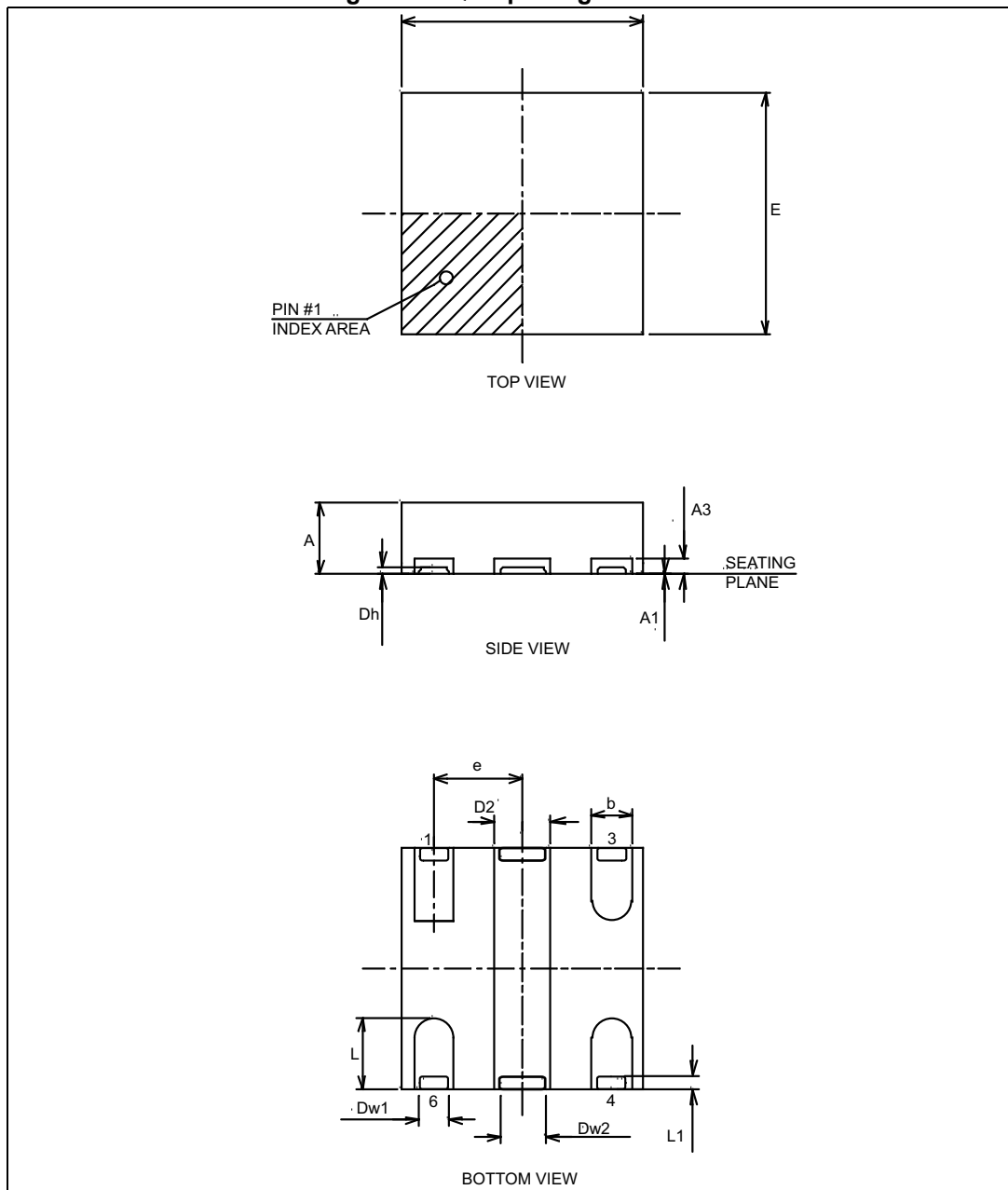


Table 3. QFN package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.85	0.90	0.0315	0.0335	0.0354
A1	0.00	0.02	0.05	0.00	0.0008	0.0020
A3		0.203			0.0080	
b	0.45	0.50	0.55	0.0178	0.0197	0.0217
D	2.95	3.00	3.05	0.1161	0.1181	0.1201
E	2.95	3.00	3.05	0.1161	0.1181	0.1201
e		1.105			0.0436	
L	0.85	0.90	0.95	0.0335	0.0354	0.0374
D2	0.60	0.70	0.80	0.0236	0.0276	0.0315
L1	0.07	0.15	0.23	0.0028	0.0060	0.0091
Dw1	0.30	0.35	0.40	0.0118	0.0138	0.0157
Dh <sup>(2)</sup>	0.10			0.0039		
Dw2 <sup>(2)</sup>	0.50	0.55	0.60	0.0197	0.0217	0.0236

1. Values in inches are converted from mm and rounded to 4 decimal digits.
2. Solder filled dimples

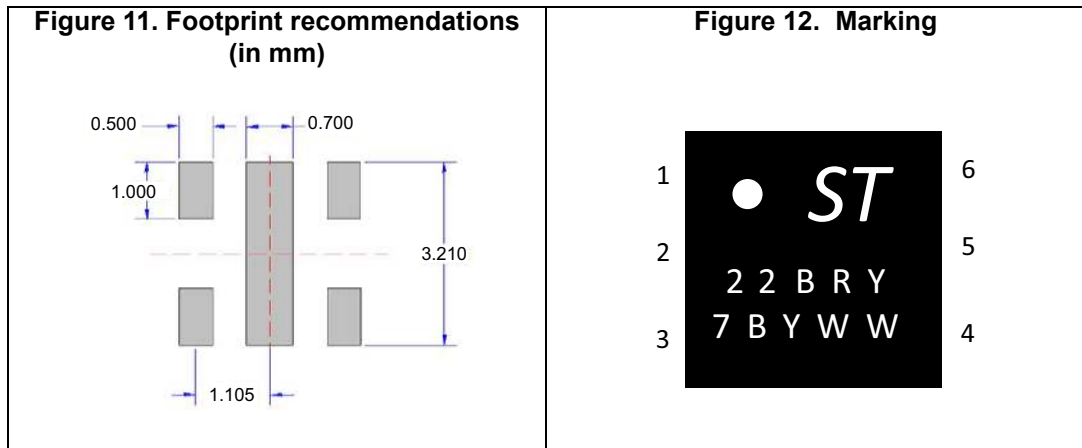
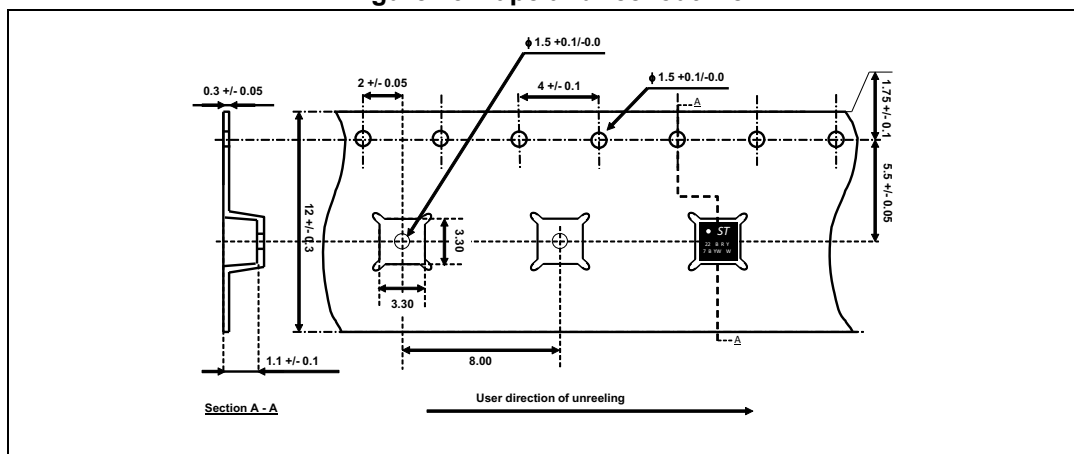


Figure 13. Tape and reel outline

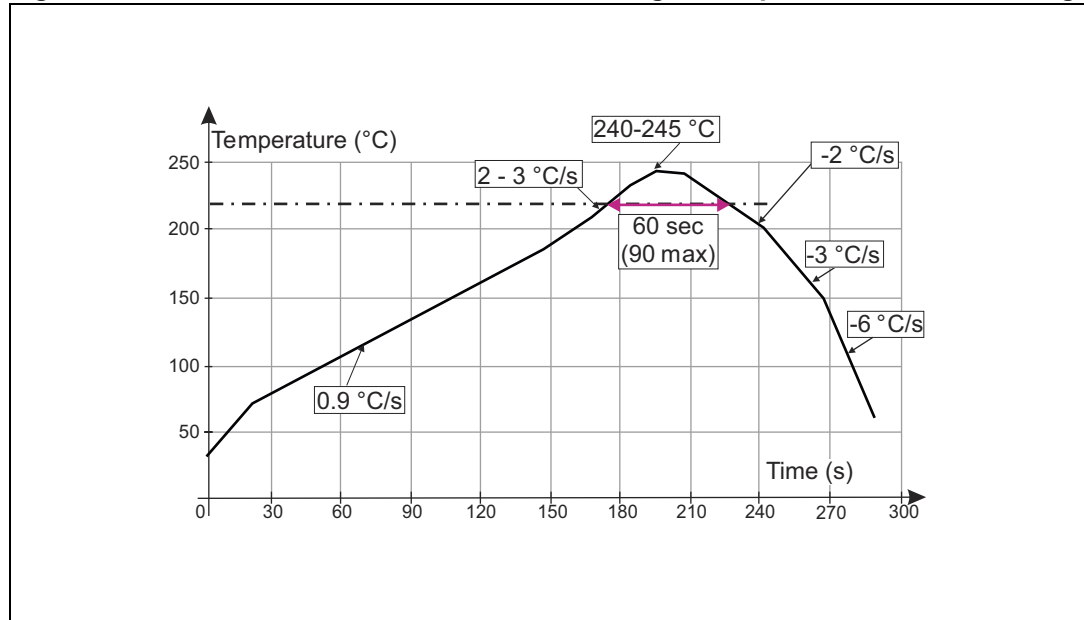




### 3 Recommendation on PCB assembly

#### 3.1 Reflow profile

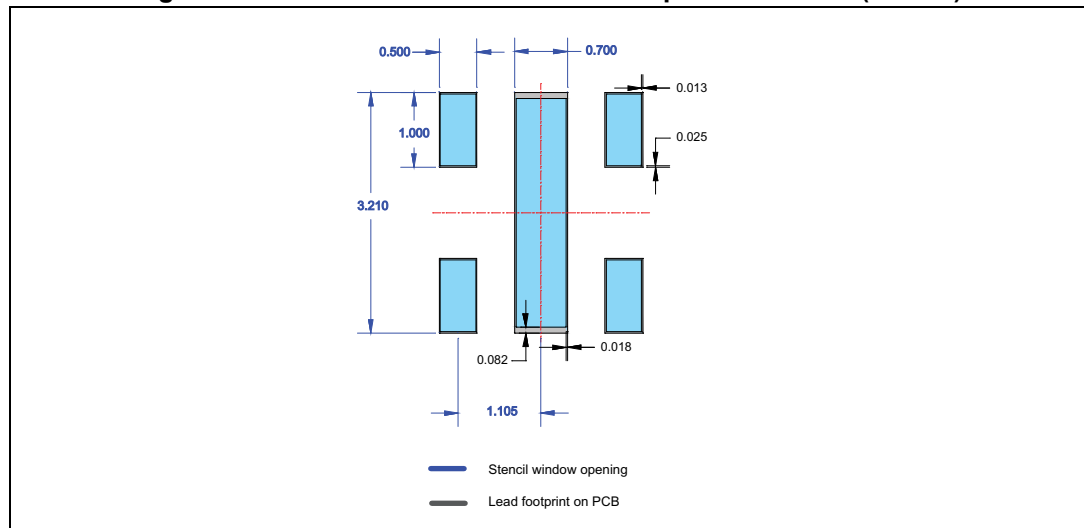
Figure 14. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-ST-020.

#### 3.2 Stencil opening design

Figure 15. Recommended stencil window position in mm (inches)



## 4 Ordering information

Figure 16. Ordering information scheme

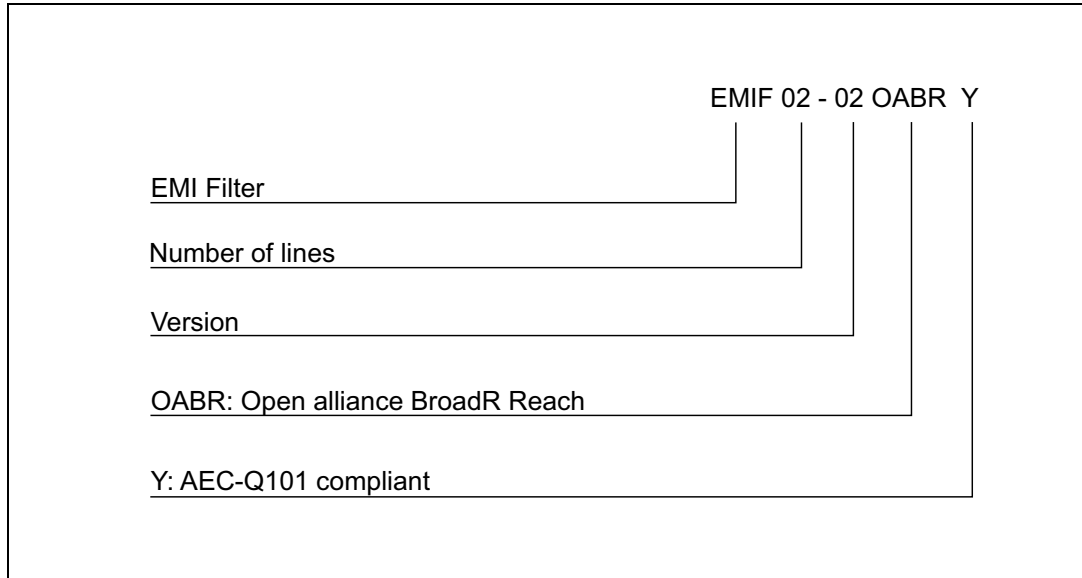


Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
EMIF02-02OABRY	22BRY	QFN 3x3 - 6L- (wetable flank)	22.5 mg	3000	Tape and reel

## 5 Revision history

Table 5. Document revision history

Date	Revision	Changes
24-Jun-2016	1	Initial release

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