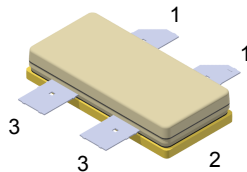


350 W 50 V HF/VHF DMOS in STAC moisture-resistant flangeless package


STAC780-4F

Pin connection	
Pin	Connection
1	Drain
2	Source (bottom side)
3	Gate



Product status link	
STAC4932F1MR	

Product summary	
Order code	STAC4932F1MR
Marking	STAC4932F1MR
Package	STAC780-4F
Packing	Box
Base / Bulk qty	20 / 80

Features

Order code	Frequency	V _{DD}	P _{OUT}	Gain	Efficiency
STAC4932F1MR	123 MHz	50 V	450 W	24 dB	60 %

- Improved ruggedness $V_{(BR)DSS} > 200$ V
- Load mismatch 65:1 all phases @ 350 W - 50 V - 123 MHz
- P_{OUT} = 450 W typ. with 24 dB gain at 123 MHz
- In compliance with the 2002/95/EC European directive
- Moisture resistant package specifically designed to operate in extreme environments
- Drying recommendation before soldering:
 - 48 hrs at 125 °C
- Back finishing:
 - Sn96.5/Ag3/Cu0.5 solder
 - Base flatness < 0.2 mm
 - Gold content < 0.1%
 - Minimum solder thickness > 2 μm

Description

The **STAC4932F1MR** is an N-channel MOS fieldeffect RF power transistor. It is intended for use in 50 V / 80 V ISM applications up to 250 MHz.

The **STAC4932F1MR** benefits from the latest generation of environmentally designed packaging, ruggedized against cyclic high moisture operation and severe storage conditions.

This device contains Beryllium oxide (BeO), which is hazardous if inhaled or ingested.

1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings (T_{CASE} = 25 °C)

Symbol	Parameter	Value	Unit
V _{(BR)DSS}	Drain source voltage	200	V
V _{DGR}	Drain-gate voltage (R _{GS} = 1 MΩ)	200	V
V _{GS}	Gate-source voltage	±20	V
T _J	Maximum operating junction temperature	200	°C
T _{STG}	Storage temperature range	-65 to +150	°C

1.2 Thermal data

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R _{thJC}	Junction-case thermal resistance	0.28	°C/W

1.3 ESD protection characteristics

Table 3. ESD protection

Symbol	Test Methodology	Class
HBM	Human Body Model (per JESD22-A114)	1C

2 Electrical characteristics

$T_{CASE} = +25\text{ }^{\circ}\text{C}$ (unless otherwise specified)

2.1 Static

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain - source Breakdown voltage	$V_{GS} = 0\text{ V}, I_{DS} = 100\text{ mA}$	200	240		V
I_{DSS}	Zero gate voltage drain leakage current	$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}$			1	mA
I_{GSS}	Gate - source leakage current	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			250	nA
V_{TH}	Gate - source threshold voltage	$V_{DS} = 10\text{ V}, I_D = 250\text{ mA}$	2.0		4.0	V
$V_{DS(ON)}$	Drain - source on voltage	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$			3.6	V
G_{FS}	Forward transconductance	$V_{DS} = 7\text{ V}, I_D = 2.5\text{ A}$	3.0			S
C_{ISS}	Input capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V},$ $f = 1\text{ MHz}$		580		pF
C_{OSS}	Output capacitance			180		pF
C_{RSS}	Reverse transfer capacitance			10		pF
ΔV_{TH}	Gate - source threshold voltage variation	$I_D = 250\text{ mA}$			0.2	V
ΔG_{FS}	Forward transconductance variation	$V_{DS} = 7\text{ V}, I_D = 2.5\text{ A}$			0.6	S

2.2 Dynamic

Table 5. Dynamic ⁽¹⁾

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	Output power		350	450	-	W
η_D	Drain efficiency	$P_{OUT} = 350\text{ W}$		60	-	%
G_{ps}	Power gain	$P_{OUT} = 350\text{ W}$		24	-	dB

1. $V_{DD} = 50\text{ V}, I_{DQ} = 2 \times 250\text{ mA}, f = 123\text{ MHz}$

Table 6. GFS sorts

Marking	Minimum	Maximum
A	3.0	3.6
B	3.6	4.2
C	4.2	4.8
D	4.8	5.4
E	5.4	6.0
F	6.0	6.6
G	6.6	7.2
H	7.2	7.8
I	7.8	8.4
J	8.4	9.0

3 SOA and Thermal data

Figure 1. Safe operating area

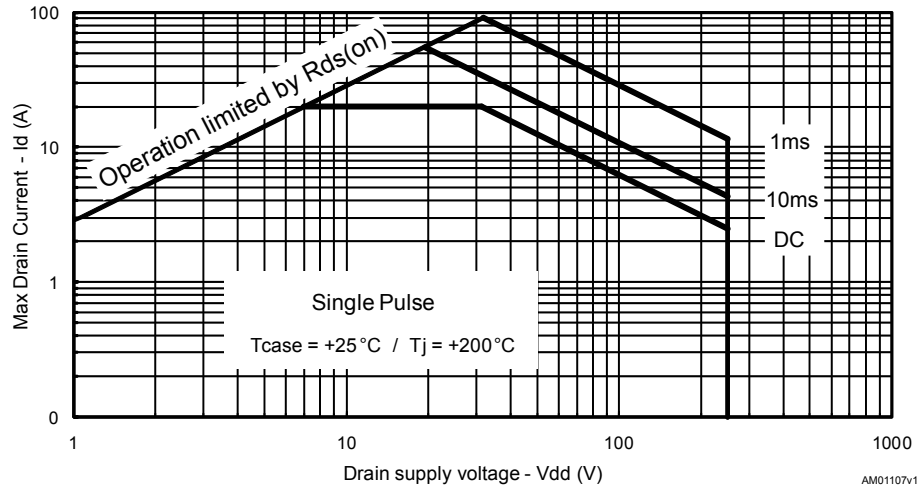


Figure 2. Transient thermal impedance

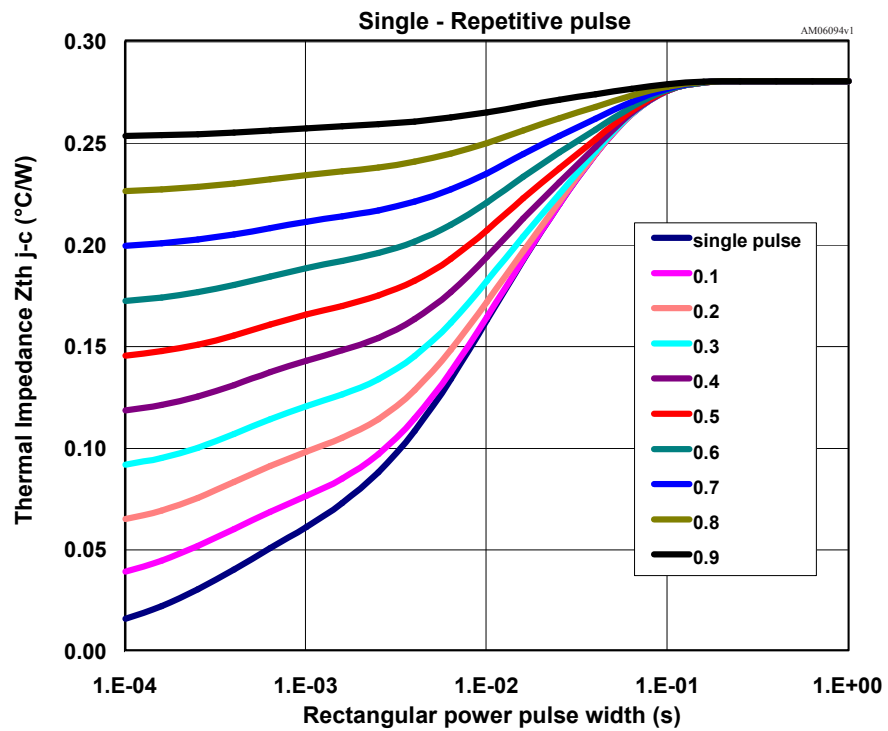
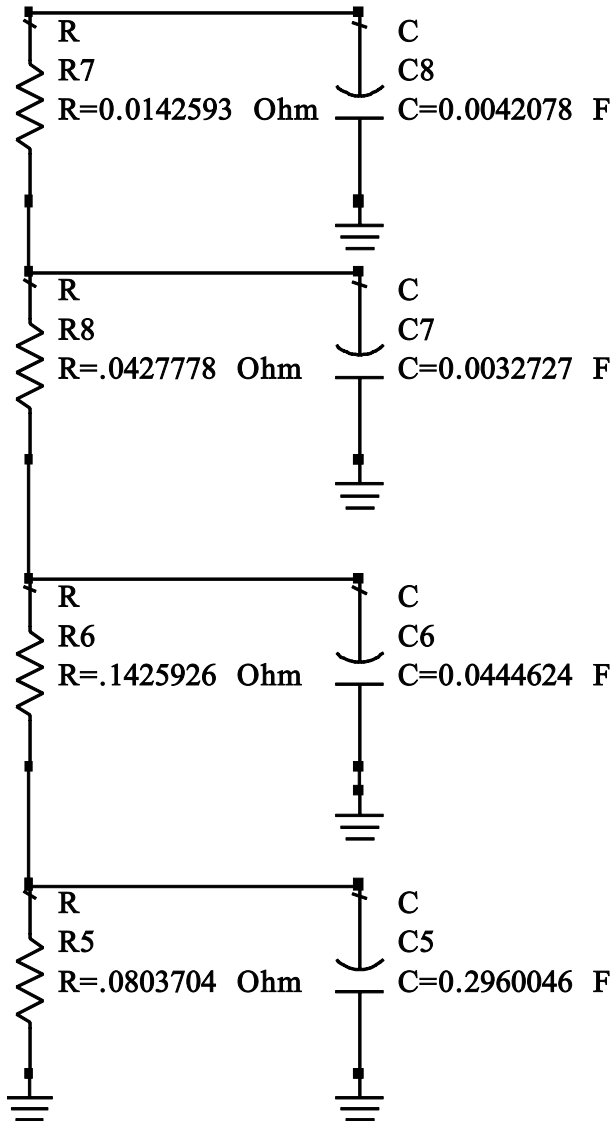


Figure 3. Transient thermal model

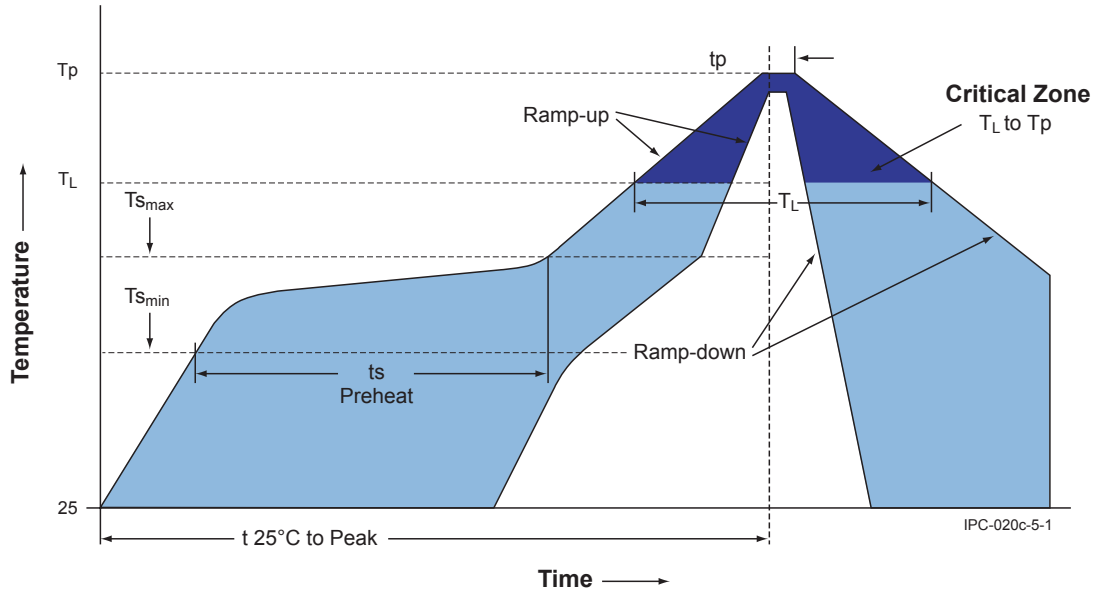


AM06106v1

4 Product and environmental safety for toxic materials use

This product contains beryllium oxide. The product is entirely safe provided that the BeO base is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general or domestic waste.

5 Recommended heat profile and reflow soldering

Figure 4. Reflow profile chart


Note: $t_p = 20-40$ s, ramp-up = 3 °C/s max., $t_L = 60-150$ s, ramp-down = 6 °C/s max., $T_L = 217$ °C, T_S max. = 200 °C, T_S min. = 150 °C, $t_s = 60 - 180$ s, from $T_j = 25$ °C to peak = 8 minutes max., $t_p =$ see Table 7.

Table 7. Pb-free process - package classification reflow temperatures ⁽¹⁾

Package thickness	Volume mm ³ < 350	Volume mm ³ 350-2000	Volume mm ³ > 2000
< 1.6 mm	260 + 0 °C	260 + 0 °C	260 + 0 °C
1.6 mm - 2.5 mm		250 + 0 °C	245 + 0 °C
≥ 2.5 mm	250 + 0 °C	240 + 0 °C	

1. Tolerance: the device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means peak reflow temperature + 0 °C. For example 260 °C + 0 °C) at the rated MSL level.

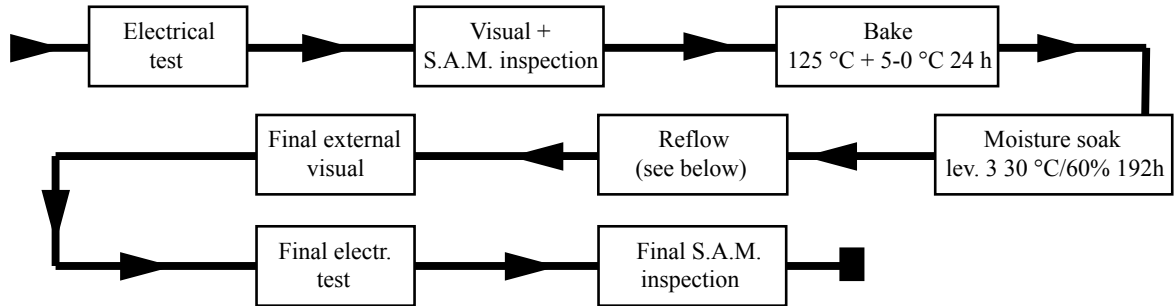
Note: The profiling tolerance is + 0 °C, -X °C (based on machine variation capability) whatever is required to control the profile process but at no time will it exceed - 5 °C. The producer assures process compatibility at the peak reflow profile temperatures.

Note: Package volume excludes external terminals (balls, bumps, lands, leads) and/or nonintegral heat sinks.

Note: The maximum component temperature reached during reflow depends on package thickness and volume. The use of convection reflow processes reduces the thermal gradients between packages. However, thermal gradients due to differences in thermal mass of SMD packages may still exist.

5.1 Evaluation flow

Figure 5. Evaluation flow



SMD1309131539

Note: The STAC4932F1MR can withstand 3 times reflow.

5.2 Manual leads soldering

- 10 sec max at temperature lower than 260 °C
- 3 sec max at temperature lower than 350 °C
- Use of ESD protected soldering iron (80 W)

5.3 Acceptable missing soldering

Figure 6. STAC tinning limit

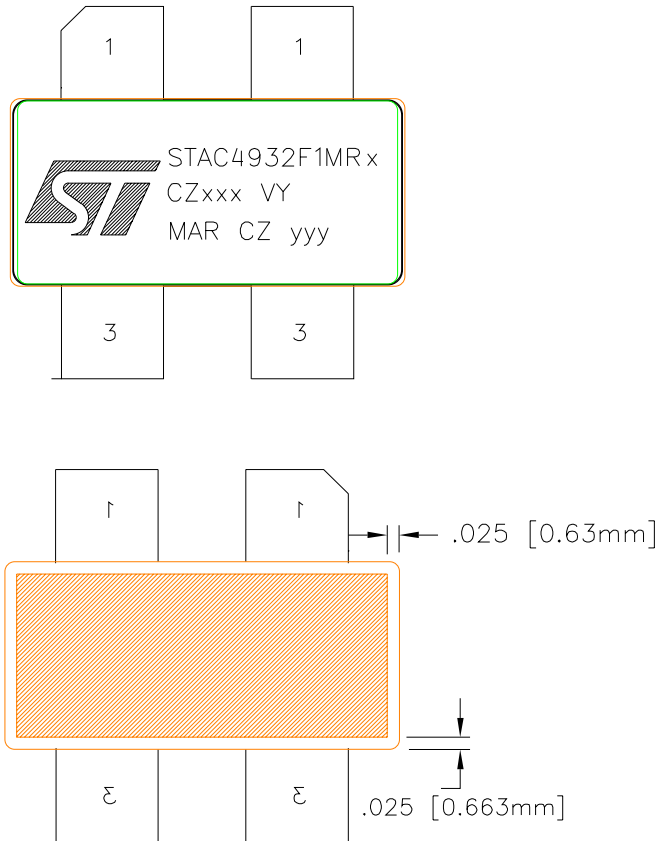
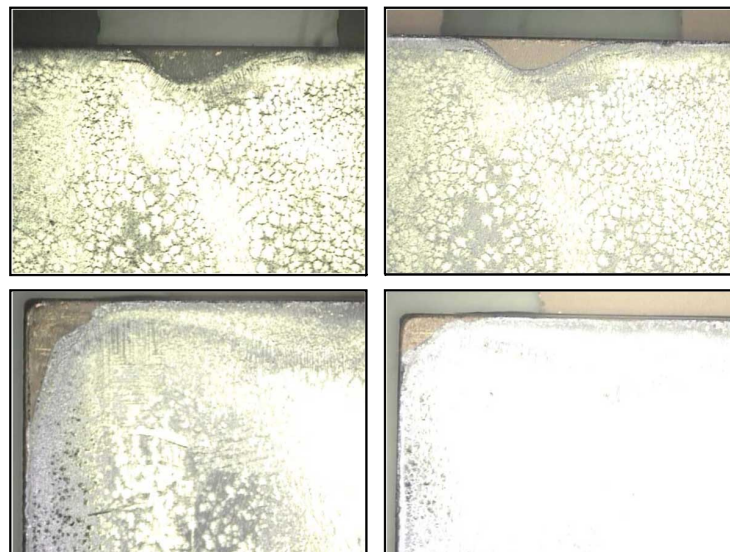


Figure 7. Examples of acceptable missing solder

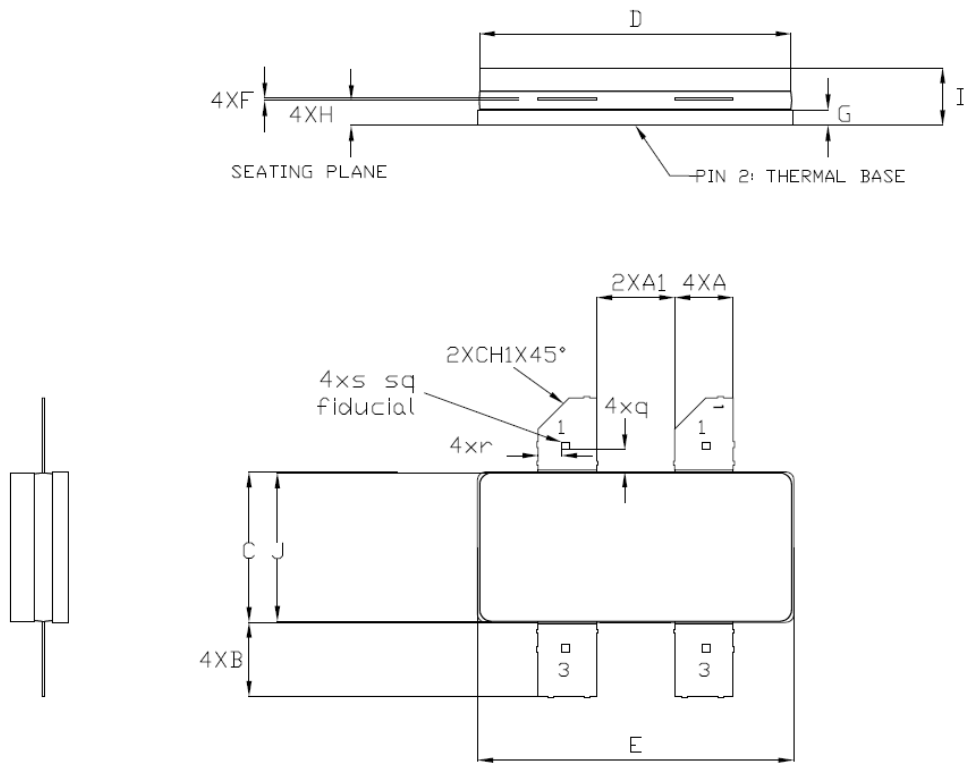


6 Package information

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. ECOPACK is an ST trademark.

6.1 STAC780-4F package information

Figure 8. STAC780-4F package outline



PIN	CONNECTIO N
1	DRAIN
2	SOURCE
3	GATE

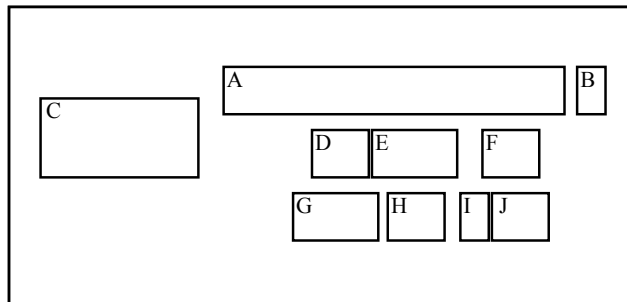
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Table 8. STAC780-4F mechanical data

Ref.	Millimeters		
	Min.	Typ.	Max.
A	3.76		3.86
A1	5.03		5.13
B	4.57		5.08
C	9.65		9.91
D	20.17		20.37
E	20.45		20.70
F	0.11		0.17
G	0.97		1.14
H	1.52		1.70
I	3.18		4.32
J	9.52		9.78
q		1.37	
r		1.52	
s		0.51	
CH1		2.03	

6.2 Marking information

PACKAGE FACE TOP



LEGEND

- Marking Composition Field
- A - MARKING AREA
- B - ADDITIONAL INFORMATION
(MAX CHAR ALLOWED = 1)
- C - STANDARD ST LOGO
- D - Assy Plant
(PP)
- E - FE Sequence
(nnn)
- F - Diffusion Traceability Plant
(WX)
- G - COUNTRY OF ORIGIN
(MAX CHAR ALLOWED = 3)
- H - Test and Finishing Plant
(TF)
- I - Assy Year
(Y)
- J - Assy Week
(WW)

6.3 Packing and shipping specifications

Table 9. Packing and shipping data

Order codes	Packaging	Pcs per tray	Dry pack humidity	GFS and lot code
STAC4932F1MR	Box (plastic tray)	20	< 10%	Two codes max.

Note: Dry pack specification in accordance with JEDEC J-STD-033.

Revision history

Table 10. Document revision history

Date	Version	Changes
24-Oct-2013	1	First release.
17-Apr-2020	2	Updated package information. Added Section 1.3 ESD protection characteristics.

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