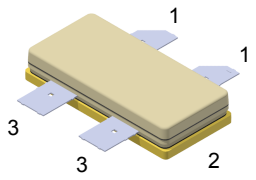
STAC1214-350

Datasheet

350 W, 50 V, 1200 to 1400 MHz RF power LDMOS transistor



STAC780-4F

Pin connection	
Pin	**Connection**
1	Drain
2	Source
3	Gate

Features

Order code	Frequency	V_{DD}	P_{OUT}	Gain	Efficiency
STAC1214-350	1200 to 1400 MHz	50 V	350 W	14 dB	55%

- High efficiency and linear gain operations
- Integrated ESD protection
- Internal input matching for ease of use
- Large positive and negative gate/source voltage range for improved class C operation
- In compliance with the European Directive 2002/95/EC

Applications

- L-band radars

Description

The STAC1214-350 is a 50 V common-source N-channel enhancement-mode lateral field-effect RF power transistor designed for L-band radar applications.

Product status link
STAC1214-350

Product summary	
Order code	STAC1214-350
Marking	1214-350
Package	STAC780-4F
Packing	Box

1 Electrical ratings

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	115	V
V_{GS}	Gate-source voltage	-8/+10	V
V_{DD}	Drain supply voltage	55	V
T_{STG}	Storage temperature range	-65 to +150	°C
T_J	Junction temperature	+200	°C

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Junction-case thermal resistance T_{CASE} = +85 °C , T_J = +200 °C, DC test	0.28	°C/W

Table 3. ESD protection

Symbol	Parameter	Class
HBM	Human body model (according to JESD22-A114)	2

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified)

Table 4. Static (per side)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 100 µA	115			V
I_{DSS}	Zero-gate voltage drain current	V_{GS} = 0 V, V_{DS} = 50 V			1	µA
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = 6 V			1	µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = 50 V, I_D = 50 mA		2.9		V
$V_{DS(on)}$	Static drain-source on-voltage	V_{GS} = 10 V, I_D = 5 A		2.3		V
C_{RSS}	Common source feedback capacitance	V_{GS} = 0 V, V_{DD} = 50 V, f = 1 MHz		2		pF
C_{OSS}	Common source output capacitance			44		pF

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
f	Frequency	Pin = 14 W, f = 1300 MHz	1200	-	1400	MHz
P_{OUT}	Output power		-	350	-	W
Gain	Power gain		-	14	-	dB
Efficiency	Drain efficiency		-	55	-	%
VSWR	Load mismatch	P_{OUT} = 350 W, all phases	-	-	10:1	

Table 6. Impedance data

Frequency (in MHz)	Input impedance (Z_{IN})	Drain load impedance (Z_{DL})
1200	0.12-0.72	3.07+1.82
1300	0.17-0.96	3.18+0.97
1400	0.28-1.3	2.81+0.35

Note: V_{DD} = 50 V, I_{DQ} = 30 mA, pulsed CW, PW = 10 µs, DC = 1%.

2.1 Typical performance

Figure 1. **Gain vs output power (1200 – 1400 MHz frequency band)**

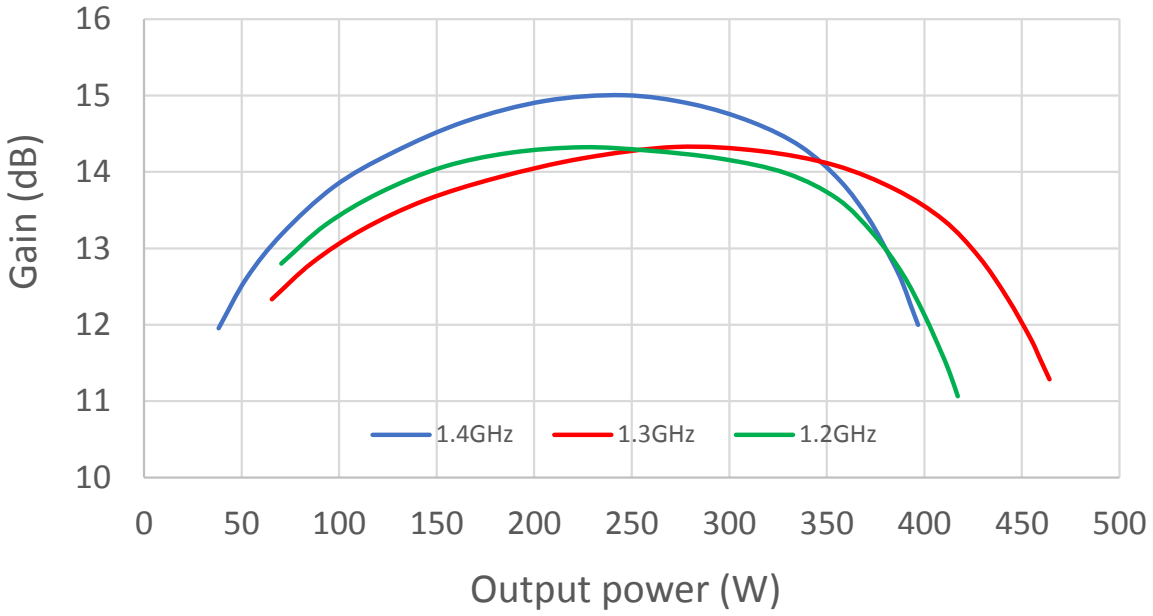


Figure 2. **Efficiency vs output power (1200 – 1400 MHz frequency band)**

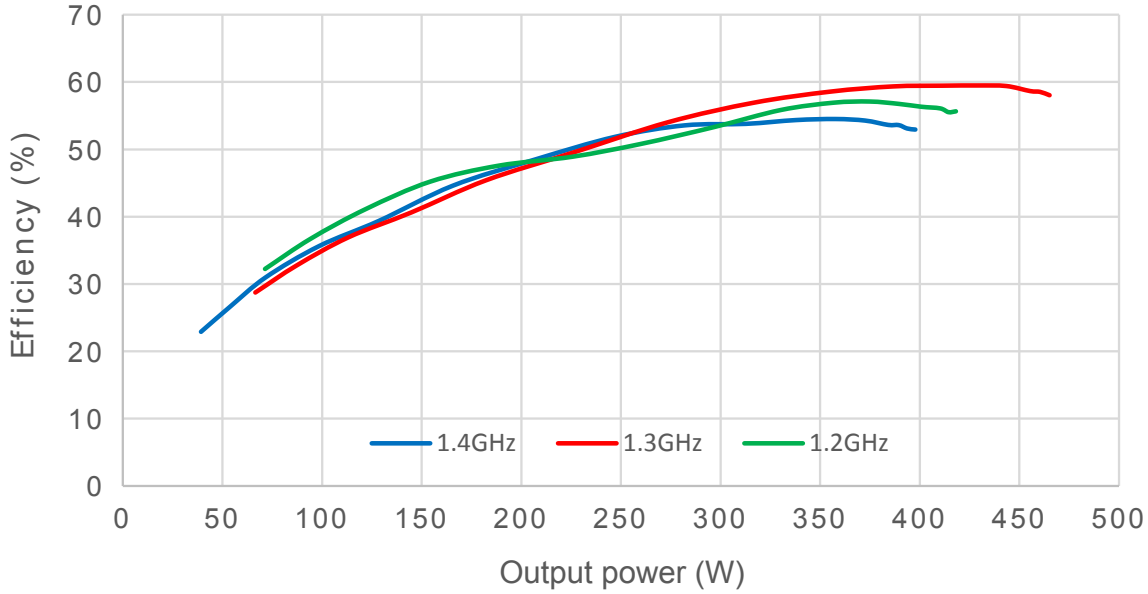
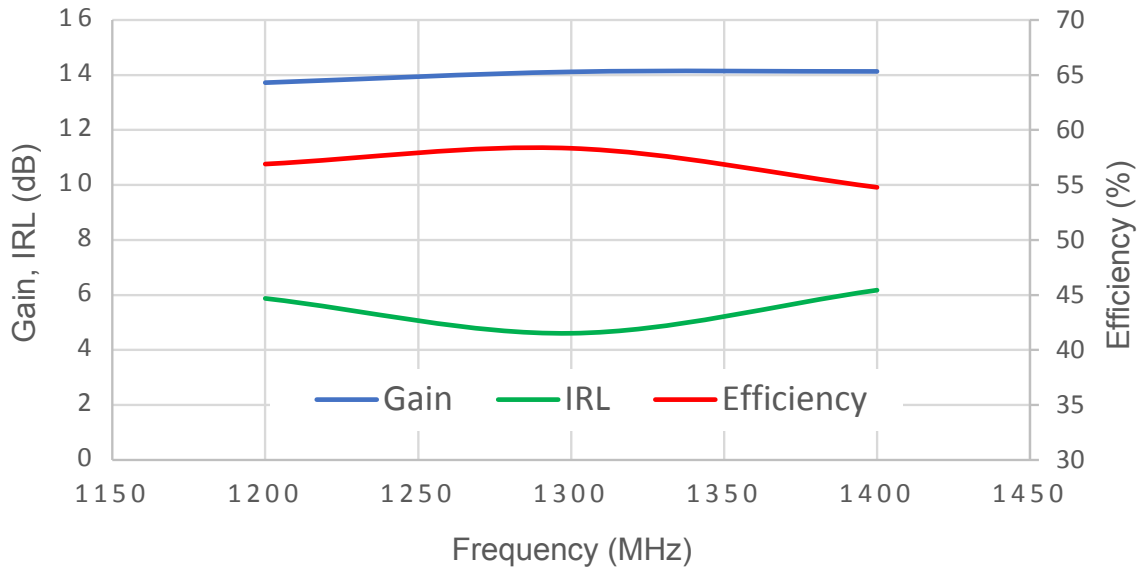
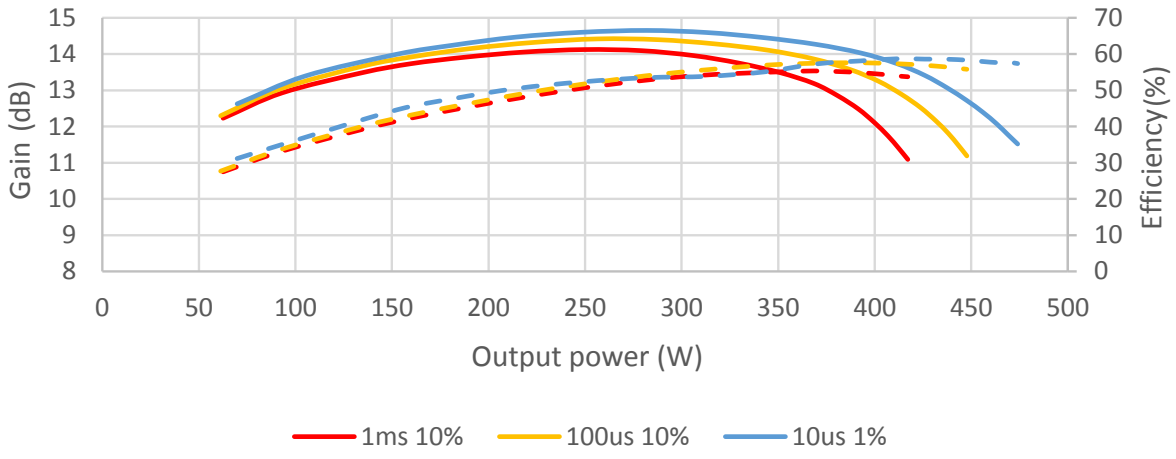


Figure 3. **Gain, IRL and efficiency vs frequency (P_{OUT} = 350 W)**



Note: *V_{DD} = 50 V, I_{DQ} = 30 mA, Pulsed CW, PW = 10 µs, DC = 1%.*

Figure 4. **Gain and efficiency vs output power at different PW and DC (f = 1300 MHz)**



Note: *V_{DD} = 50 V, I_{DQ} = 30 mA*

3 Test circuits

Figure 5. **Test circuit schematic**

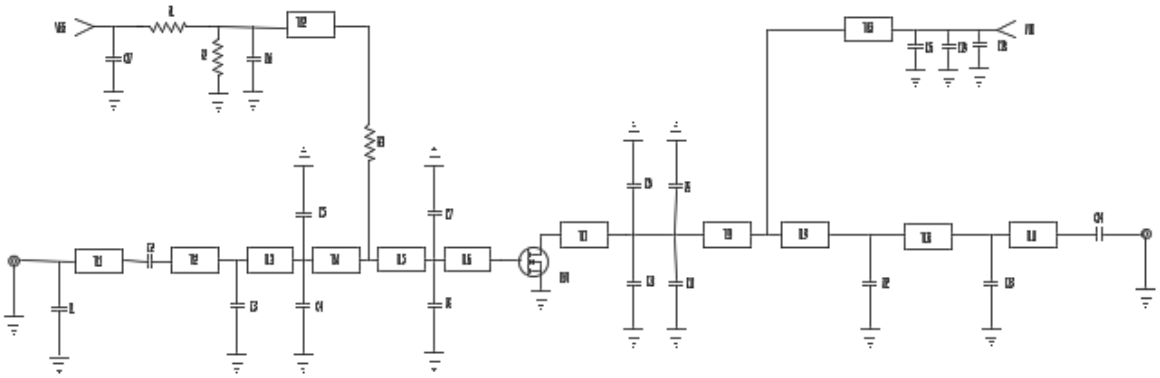


Figure 6. **Test circuit layout**

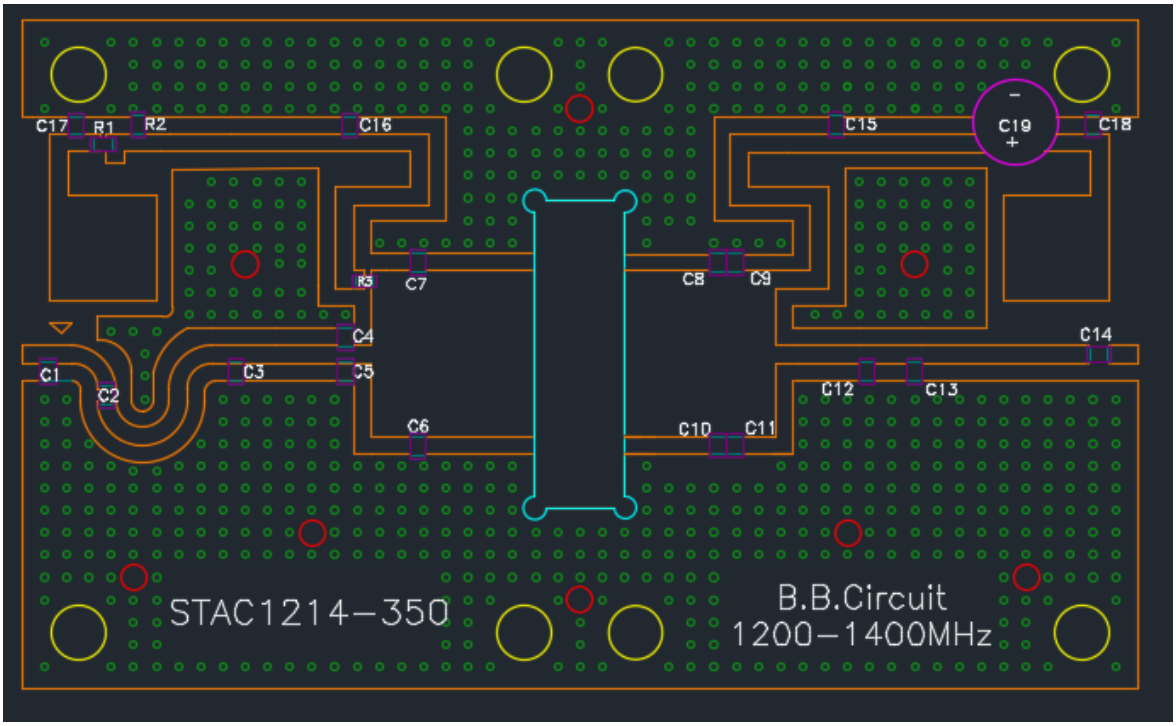


Table 7. **Component list**

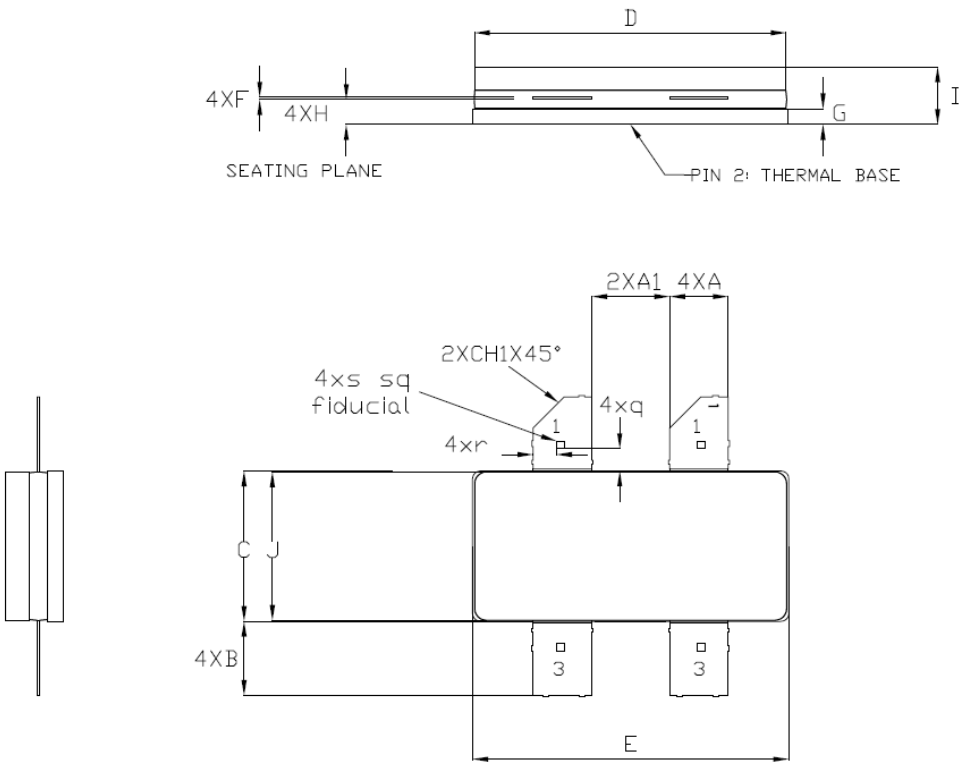
Item	Qty	Part number	Vendor	Description, dimension (x, y)
C2, C14,C15,C16	4	1111C360G501X	Passive Plus Inc.	36 pF chip ceramic capacitor
C1	1	1111C2R0G501X	Passive Plus Inc.	2 pF chip ceramic capacitor
C3,C8,C10	1	1111C3R3G501X	Passive Plus Inc.	3.3 pF chip ceramic capacitor
C4,C5	3	1111C1R3G501X	Passive Plus Inc.	1.3 pF chip ceramic capacitor
C6,C7	2	1111C2R7G501X	Passive Plus Inc.	2.7 pF chip ceramic capacitor
C9,C11	2	1111C0R2G501X	Passive Plus Inc.	0.2 pF chip ceramic capacitor
C12,C13	1	1111C1R2G501X	Passive Plus Inc.	1.2 pF chip ceramic capacitor
C17, C18	2	ATC200B103JT50X	ATC	10000 pF chip ceramic capacitor
C19	1	TVX1J102MCD	Nichicon	1000 µF, 63 V electrolytic capacitor
R1	1	CR1206-4W-1001JB	Venkel	1 kΩ surface mount resistor
R2	1	CR1206-4W-474JB	Venkel	4.74 MΩ surface mount resistor
R3	1	CR1206-4W-270JB	Venkel	27 Ω surface mount resistor
T1				L = 0.320 in W = 0.082 in
T2				L = 0.850 in W = 0.082 in
T3				L = 0.500 in W = 0.082 in
T4				L = 0.110 in W = 0.082 in
T5				L = 0.210 in W = 0.748 in
T6				L = 0.525 in W = 0.748 in
T7				L = 0.554 in W = 0.748 in
T8				L = 0.220 in W = 0.748i n
T9				L = 0.411 in W = 0.082 in
T10				L = 0.210 in W = 0.082 in
T11				L = 0.781 in W = 0.082 in
T12				L = 1.35 in W = 0.082 in
T13				L = 1.6 in W = 0.082 in
Board 3X5	1		Rogers corp	0.030 THK , Er = 2.5, 2Oz Cu both sides

4 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.

4.1 STAC780-4F package information

Figure 7. STAC780-4F package outline



PIN	CONNECTION
1	DRAIN
2	SOURCE
3	GATE

DM00481940-1

Table 8. **STAC780-4F mechanical data**

Ref.	Milimeters		
	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	

Revision history

Table 9. **Document revision history**

Date	Version	Changes
05-Sep-2018	1	Initial release
04-Aug-2020	2	Updated product summary in cover page. Added Pin connection in cover page. Updated Table 2. Thermal data and Section 2 Electrical characteristics. Added Section 2.1 Typical performance and Section 3 Test circuits. Minor text changes.

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