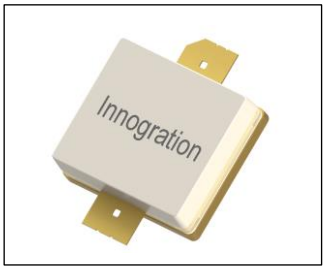
GaN HEMT 28V, HF-1.5GHz 75W, RF Power Transistor



Description

The STCH15075A2C is a 75W GaN HEMT, designed for multiple application up to 1.5GHz

It can be used in CW, Pulse and any other modulation modes. There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical class AB 1.5-1.6GHz RF Performance with device soldered

  Vds=28V, Idq=80mA，CW

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
1500	47.39	54.86	59.10	16.99	49.32	85.60	71.49
1550	46.99	50.05	58.18	17.32	49.27	84.52	72.88
1600	46.59	45.63	58.41	17.46	49.00	79.47	74.46

- Typical class AB 700-750MHz RF Performance with device soldered

  Vds=28V, Idq=390mA，CW

Freq (MHz)	Pulse CW Signal(1)			P_{avg}=39.5dBm WCDMA Signal(2)		
	P1-Gain (dB)	P3 (dBm)	P3 (W)	Gp (dB)	η_D (%)	$ACPR_{5M}$ (dBc)
700	20.80	48.65	73	21.10	29.65	-40.60
725	20.20	48.58	72	20.50	30.00	-42.50
750	19.80	48.30	68	20.01	30.80	-42.50

Applications

- L band power amplifier
- P band power amplifier
- ISM/RF Energy power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce VGS down to VP, typically –5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	50	Vdc
Maximum gate current	Igs	17	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature	T_J	+225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case by FEA T_C= 85°C, at Pdiss=30W	$R_{\theta JC}$	2.6	°C /W

Table 3. Electrical Characteristics (TA = 25℃ unless otherwise noted)

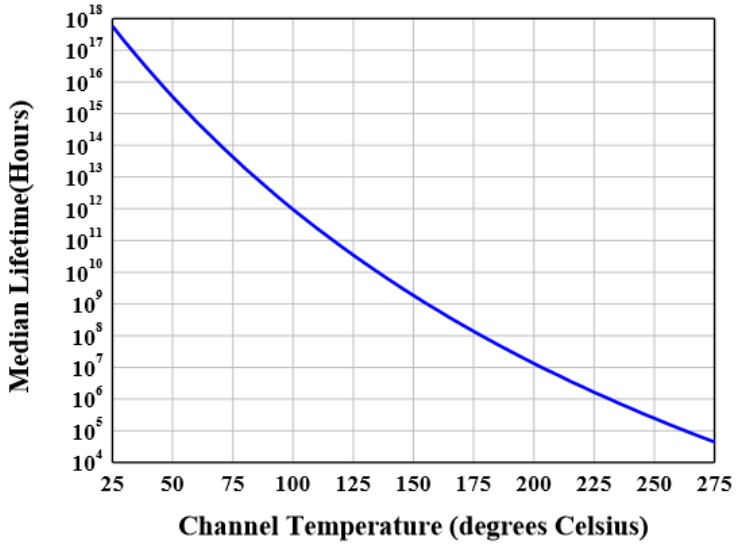
DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=17mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 17mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=80mA, Measured in Functional Test	$V_{GS(Q)}$		-3.28		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.5GHz, Pout=75W Pulsed CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature



1.5-1.6GHz
Typical performance

Figure 3: Network analyzer output S11/S21

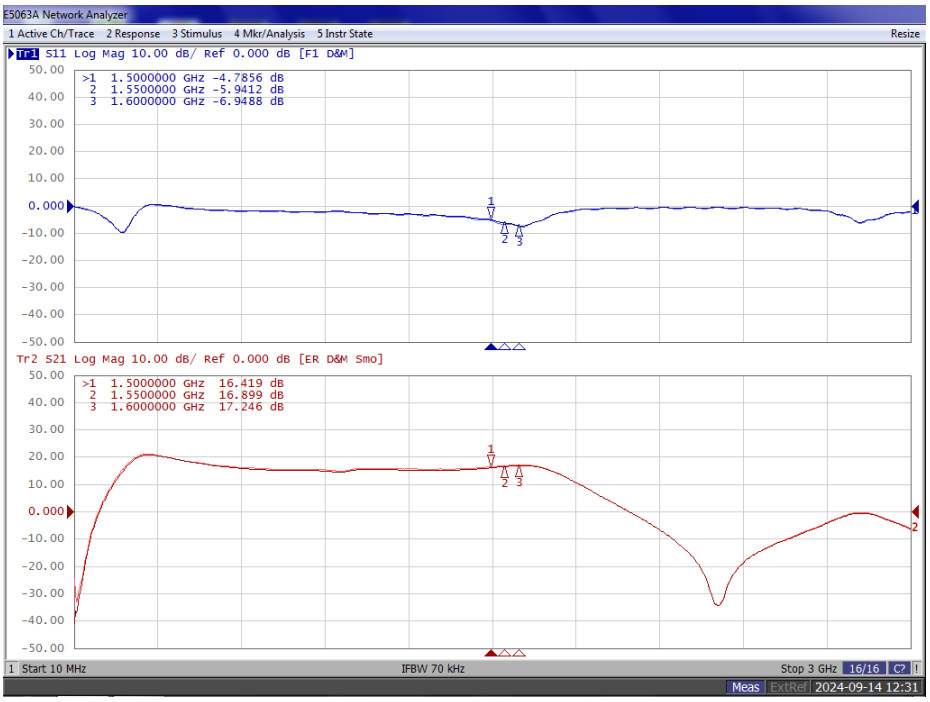
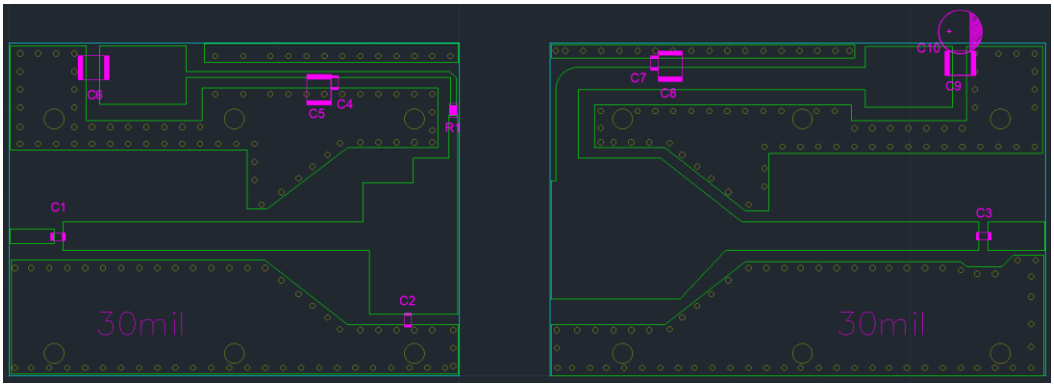


Figure 4: Picture of application board



Reference	Footprint	Value	Quantity
C1,C3,C4,C7	0603	15pF	4
C2	0603	3.3pF	1
R1	0603	10ohm	1
C5,C6,C8,C9	1210	10uF/63V	4
C10	\	470uF/63V	1
U1	A2C	STCH15075A2C	1

700-750MHz
Typical performance

Figure 5: Network analyzer output S11/S21

Figure 6：Gain，Efficiency as function of Pout： CW

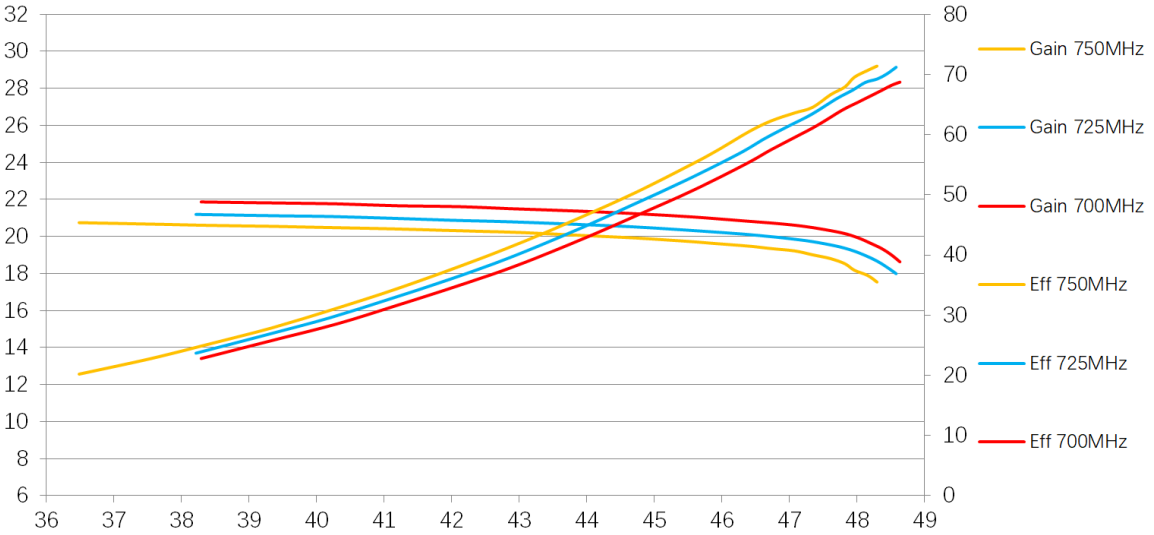
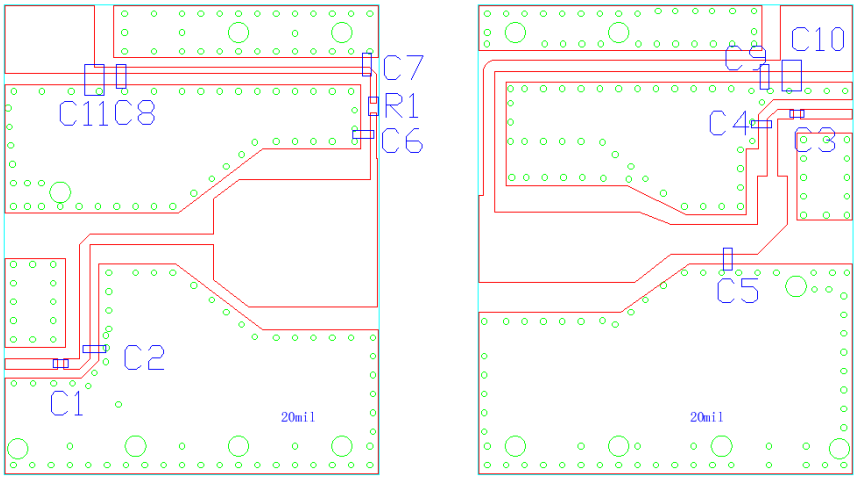
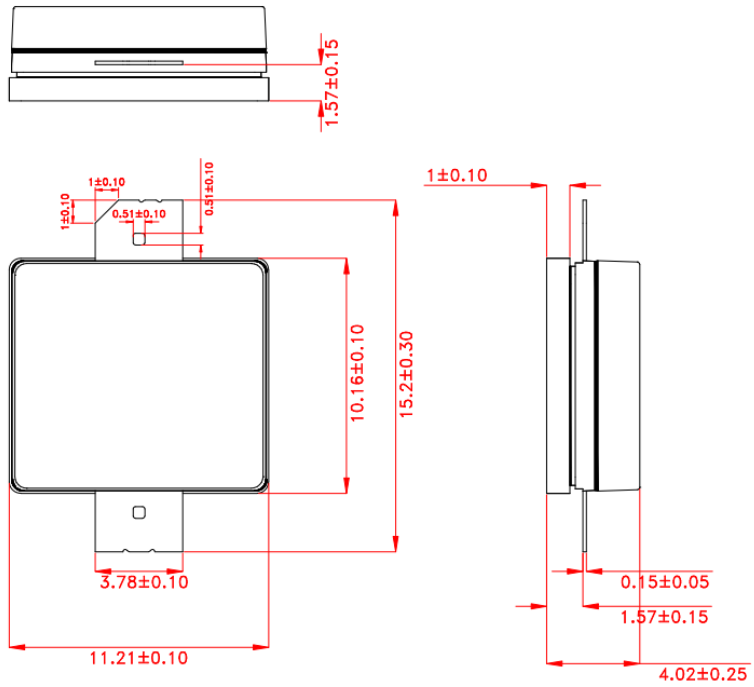


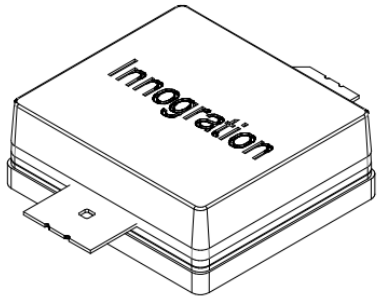
Figure 7: Picture of application board



Part	Quantity	Description	Part Number	Manufacture
C3, C8,C9	3	100pFHigh Q Capacitor	251SHS101BSE	TEMEX
C1	1	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C6	1	5.6pFHigh Q Capacitor	251SHS5R6BSE	TEMEX
C7	1	3.0pFHigh Q Capacitor	251SHS3R0BSE	TEMEX
C4	1	3.3pFHigh Q Capacitor	251SHS3R3BSE	TEMEX
C2,C5	2	3.9pFHigh Q Capacitor	251SHS3R9BSE	TEMEX
C10,C11	2	10uF MLCC	GRM32EC72A10	Murata
R1,	1	10Ω Power Resistor	ESR03EZPF100	ROHM
T1	1	75W GaN Dual Transistor	STCH15075A2C	Innogration

Package Dimensions （Unit:mm）





Unit:mm

Tolerance ±0.10mm,Except as Noted.

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/9/3	V1.0	Preliminary Datasheet Creation
2024/10/24	V1.1	Add 700-750MHz data

Application data based on: TC-24-55/LWH-24-38

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