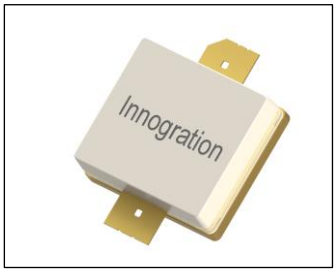
GaN 50V, 250W,UHF RF Power Transistor



Description

The STBV05250RA2C is a single ended 230 watt capable, GaN HEMT within UHF, ideal for ISM Applications at 433MHz. 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 RF performance at selected 433MHz applications with device soldered on heatsink

V_{DD} = 48Vdc, Vgs=-4.2V CW

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
435	53.72	235.4	81.6	16.16	54.09	256.7	85.0
438	53.81	240.2	81.8	16.18	54.17	261.5	85.2
445	53.92	246.9	82.0	16.03	54.27	267.5	85.0

Applications

- 433MHz RF Energy
- UHF PA

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}	55	Vdc
Maximum gate current	Igs	39.6	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 Pd=50W	$R_{\theta JC}$	0.85	°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=39.6mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 39.6mA	$V_{GS(th)}$	-4	-	-2	V
Gate Quiescent Voltage	VDS =48V, IDS=300mA, Measured in Functional Test	$V_{GS(Q)}$		--3.2		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	433MHz, Pout=250W pulse CW All phase, No device damages	VSWR		10:1		

TYPICAL CHARACTERISTICS

Figure 1: Efficiency and power gain as function of Pout

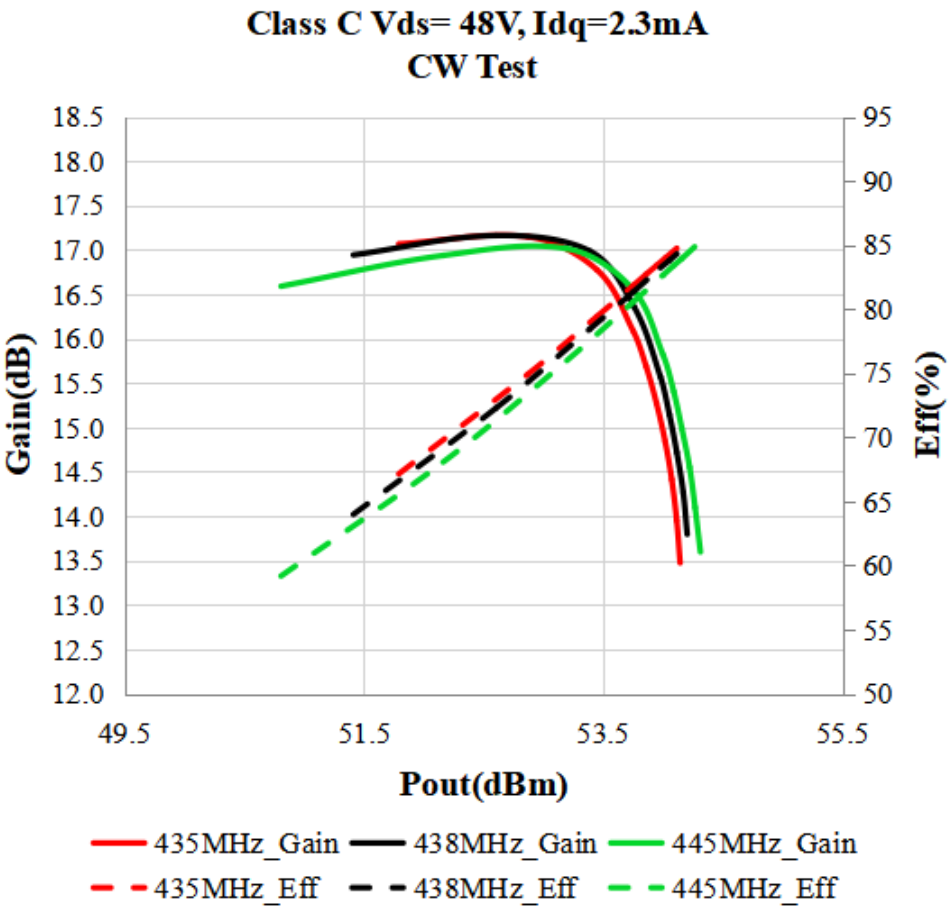


Figure 2: S11/S21 output from Network analyser

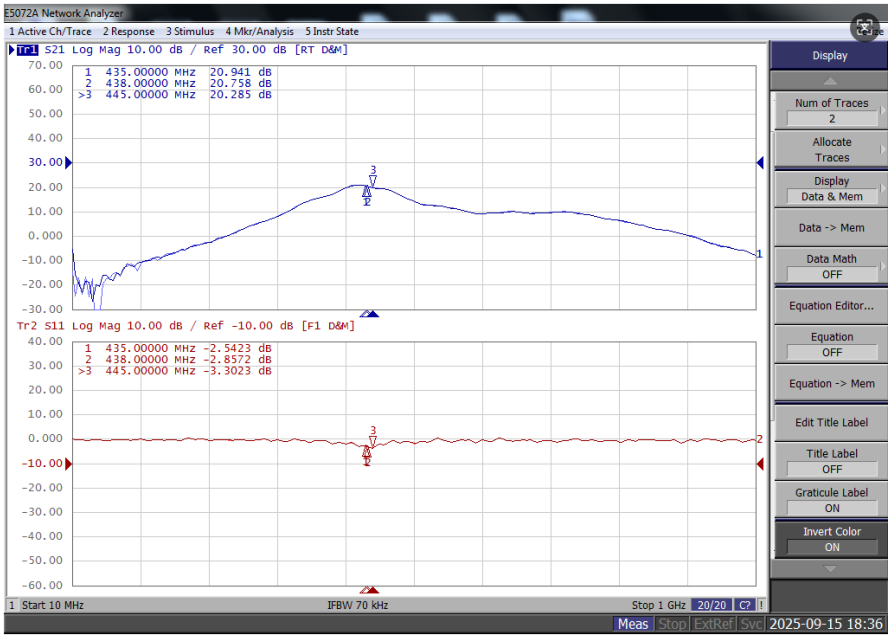
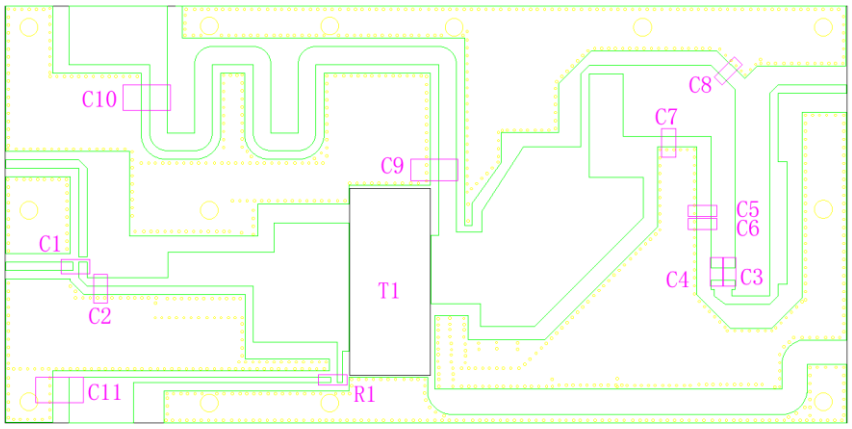
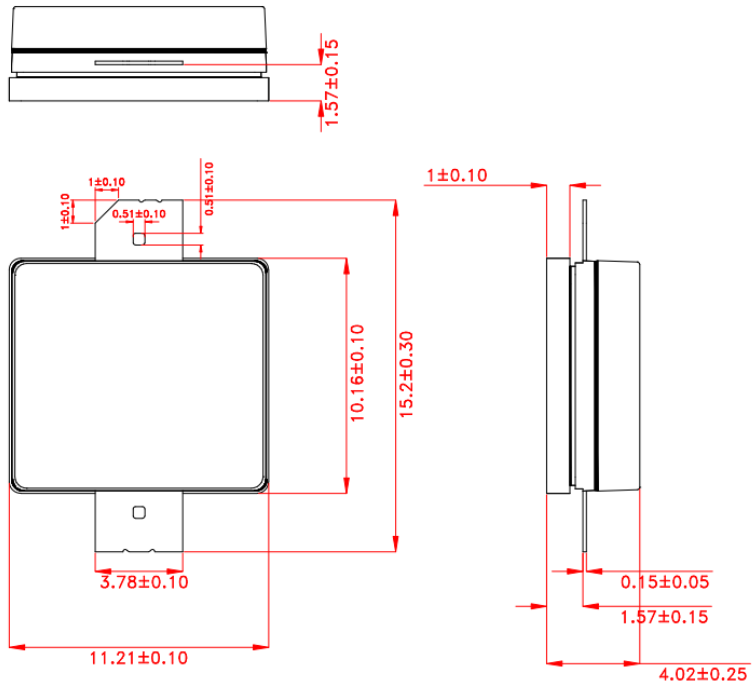


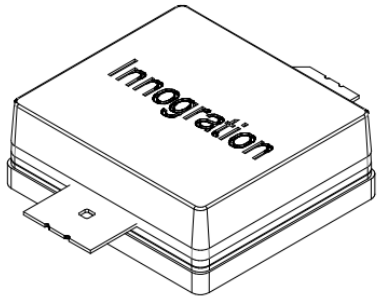
Figure 3: Reference design circuit (RO4350B 30mil, PCB DWG file upon request,)



Part	Quantity	Description	Part Number	Manufacture
C1	1	4.7pFHigh Q Capacitor	251SHS4R7BSE	TEMEX
C2	1	20pFHigh Q Capacitor	251SHS200BSE	TEMEX
C3,C4,	2	220pFHigh Q Capacitor	251SHF221BSE	TEMEX
C5,C6,C7,C8	4	1.0pFHigh Q Capacitor	251SHS1R0BSE	TEMEX
C9,C10,C11	3	10uF MLCC	GRM32EC72A106ME05	Murata
R1	1	10Ω Power Resistor	ESR03EZPF100	ROHM

Package Dimensions （Unit:mm）





Unit:mm

Tolerance ±0.10mm,Except as Noted.

Revision history

Table 1. Document revision history

Date	Revision	Datasheet Status
2024/9/19	Rev 1.0	Preliminary Datasheet

Application data based on LWH—25-38

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