



Gallium Nitride 50V, 1000W, 1.8-1.9GHz RF Power Transistor

Description

The STCV181K0CY4V is a 1000-watt, internally matched GaN HEMT, designed for 5G cellular applications with frequencies from 1.8-1.9GHz, **enabled by wide band VBW capability to support IBW up to 100MHz.**

It can be configured as asymmetrical Doherty for 4G or 5G application, delivering 120 to 140W average power, according to normal 9dB back off.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical Doherty Pulsed CW and 1C W--CDMA Characterization Performance:

$V_{DD} = 50 \text{ Vdc}$, $I_{DQA} = 250 \text{ mA}$, $V_{GSB} = -5.4 \text{ Vdc}$,

Freq (MHz)	Pulse CW Signal ⁽¹⁾				$P_{avg} = 50.5 \text{ dBm}$ WCDMA Signal ⁽²⁾		
	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)	Gp (dB)	h_D (%)	ACPR _{5M} (dBc)
1805	15.83	60.03	1007.54	63.32	15.65	54.28	-27.01
1842	16.16	60.19	1044.98	67.24	15.99	54.27	-28.10
1880	16.35	60.03	1006.49	69.90	16.17	54.55	-28.96

Driver options

- STAV27070C6 (1 stage Doherty discrete)
- ITGV22050C6 (1 stage Class AB LDMOS discrete)

Applications

- Asymmetrical Doherty amplifier within N3 5G band and B3 4G band
- L band 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

Figure 1: Pin Connection definition

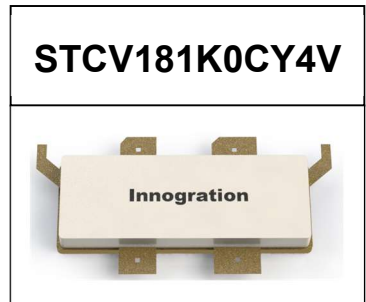
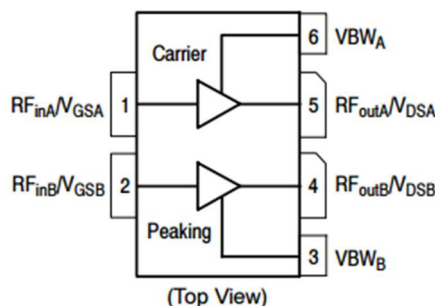




Table 1. Maximum Ratings

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	I_{gs}	131	mA
Storage Temperature Range	T_{stg}	-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 $T_c=85^{\circ}\text{C}$, $P_{out}=120\text{W}$, 1.96GHz Doherty application board	$R_{\theta JC}$	TBD	°C /W

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

DC Characteristics (main path, measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=-8\text{V}$; $I_{DS}=47\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS}=10\text{V}$, $I_D=47\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS}=50\text{V}$, $I_{DS}=240\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

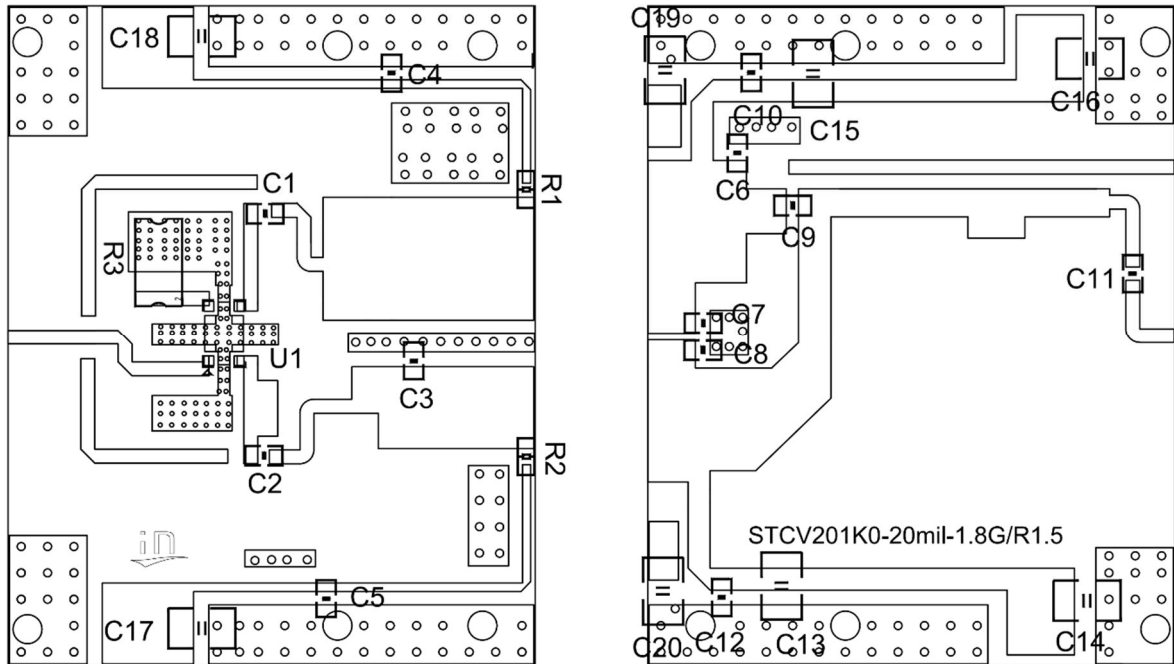
DC Characteristics (peak path, measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=-8\text{V}$; $I_{DS}=84\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS}=10\text{V}$, $I_D=84\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS}=50\text{V}$, $I_{DS}=500\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.84GHz, $P_{out}=120\text{W}$ WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 3: Picture of application board Doherty circuit for 1.8-1.9GHz



Reference	Footprint	Value	Quantity
C1, C2, C4, C5, C10, C11, C12	0805	22pF/250V	7
C3	0805	2.2pF/250V	1
C6	0805	1.6pF/250V	1
C7	0805	2.4pF/250V	1
C8	0805	3.0pF/250V	1
C13, C14, C15, C16, C17, C18, C19, C20	1210	10uF/100V	8
R1, R2	0603	10R	2
R3	5*2.5mm	RFR50-20CT0421B	1
/	CY4V	STCV181K0CY4V	1
U1	5.08*3.18mm	X3C20F1-02S	1



Figure 4: Efficiency and power gain as function of Pout

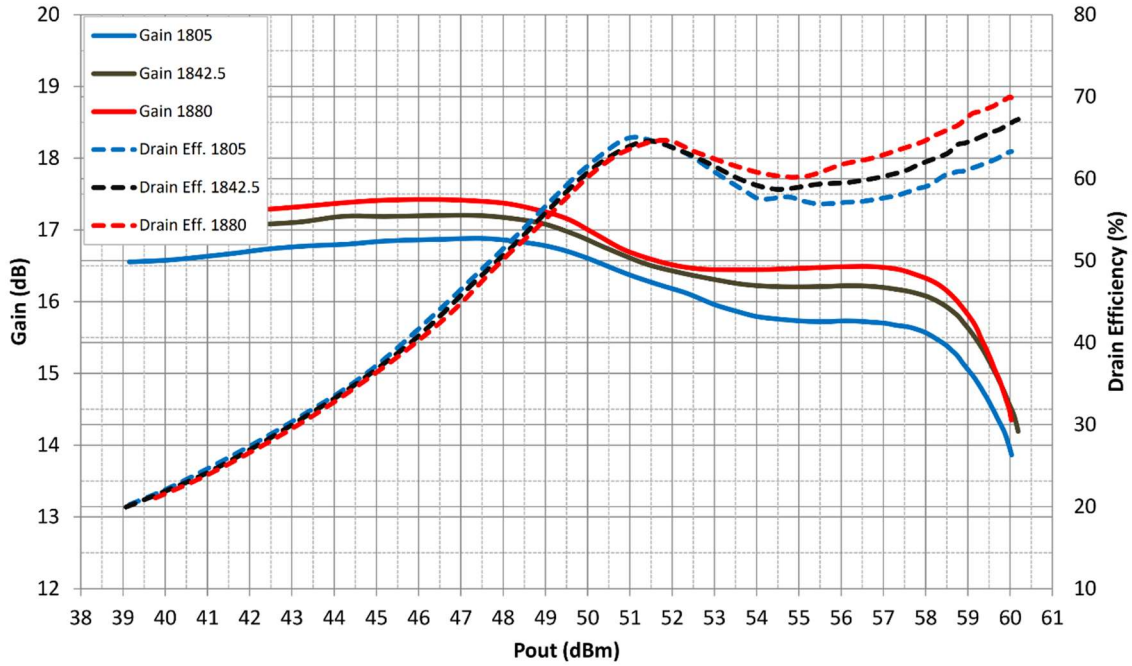
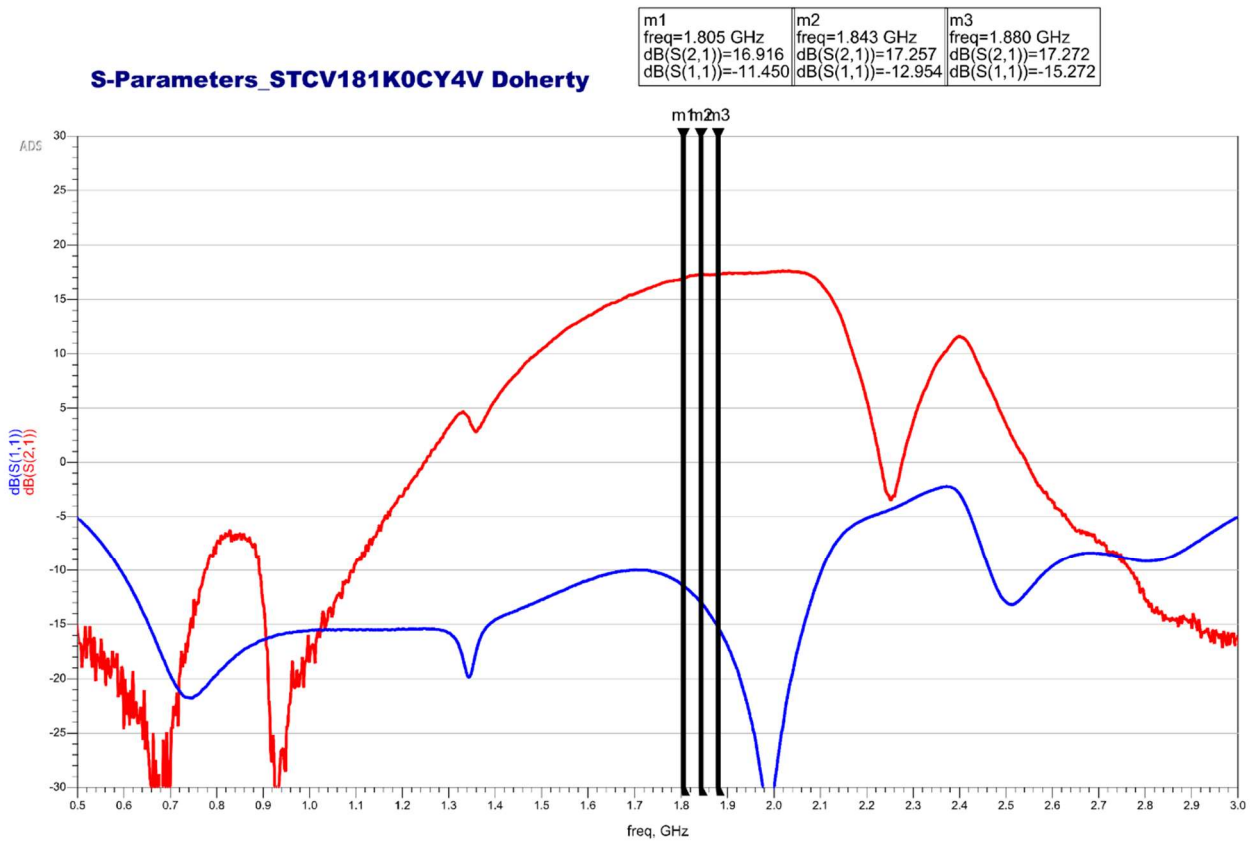
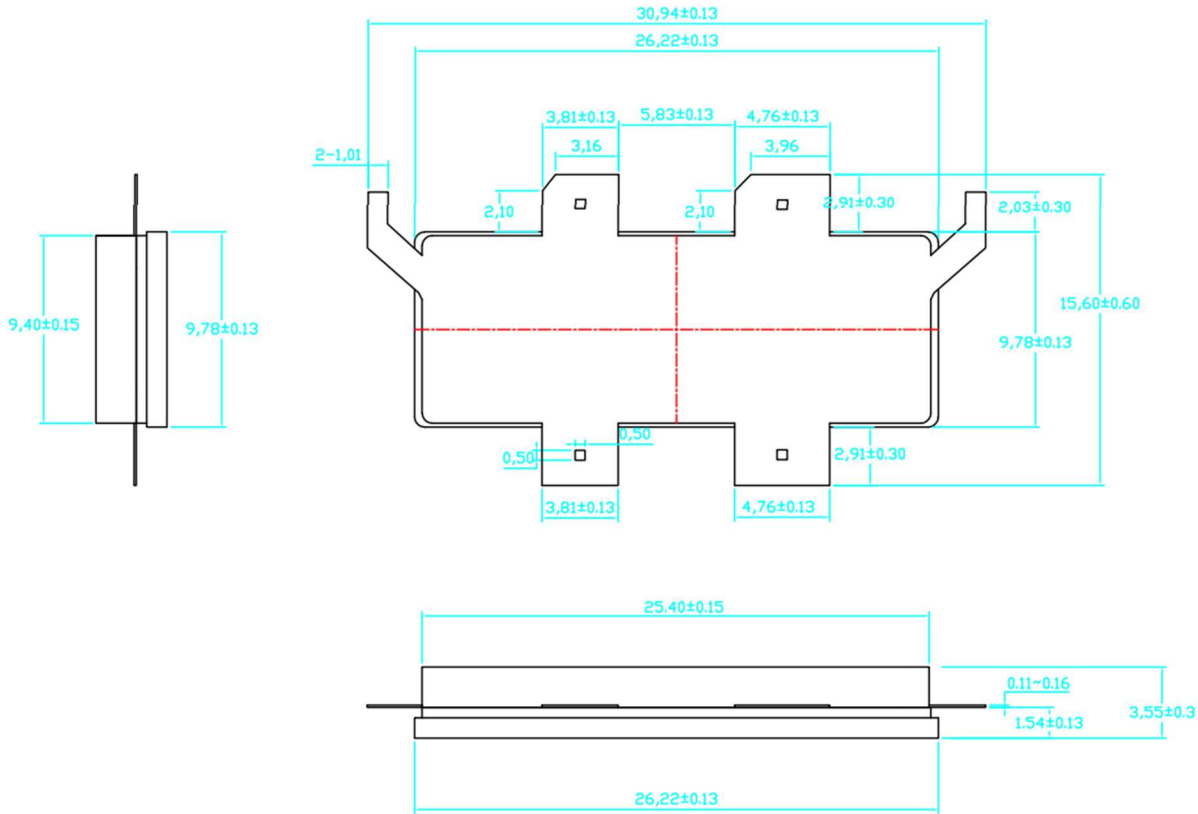


Figure 5: Network analyzer output, S11 and S21





Earless Flanged Ceramic Package; 6 leads- CY4V



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/7/20	V1.0	Preliminary Datasheet Creation

Application data based on ZBB-23-22

Notice

Specifications are subject to change without notice. Innegration believes the information within the data sheet to be reliable. Innegration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose.

“Typical” parameter is the average values expected by Innegration in quantities and are provided for information purposes only. It can and do vary in different applications and related performance can vary over time. All parameters should be validated by customer’s technical experts for each application.

Innegration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innegration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

For any concerns or questions related to terms or conditions, please check with Innegration and authorized distributors

Copyright © by Innegration (Suzhou) Co.,Ltd.