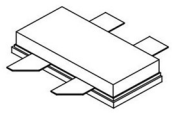
GaN HEMT 50V, 350W,1.8-2.2GHz RF Power Transistor

STBV22351BY4



Description

The STBV22351BY4 is a dual path 350watt , Input matched GaN HEMT, ideal for applications from 1.8 to 2.2GHz especially for LTE/5G

There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical WCDMA 1 carrier performance on 2.1/1.8GHz asymmetrical Doherty with device soldered

VDS= 50V, IDQ=130mA(Vgm=-3.15V，Vgp=-5.50V)

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff(%)
2110	47.5	8.35	55.83	382.4	-27.6	15.6	58.1
2140	47.5	8.31	55.80	380.6	-29.9	15.3	57.3
2170	47.5	8.41	55.91	389.5	-32.4	15.2	56.5

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff(%)
1805	47.50	7.56	55.05	320.2	-28.1	15.4	55
1842.5	47.50	7.82	55.30	338.5	-27.9	15.4	55
1880	47.50	7.69	55.18	329.5	-26.8	15.1	55

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff(%)
758	47.50	8.27	55.77	377.8	-35.7	18.8	57.8
790	47.50	8.30	55.80	380.3	-30.2	19.2	59.1
821	47.50	8.17	55.66	367.9	-29.6	18.7	56.7

Applications

- Asymmetrical Doherty amplifier within 1.8-2.2GHz
- Sub-2GHz power amplifier
- CW or pulsed 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

Transparent top view (Backside grounding for source)

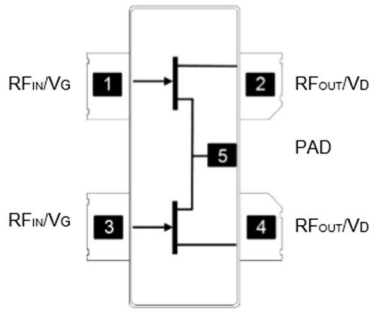


Table 1. Maximum Ratings

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	46.8	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, on Doherty application board	$R_{\theta JC}$	1.8	°C /W

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

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=16.8mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 16.8mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=130mA, Measured in Functional Test	$V_{GS(Q)}$		-3.23		V

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=30mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 30mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=130mA, Measured in Functional Test	$V_{GS(Q)}$		-3.4		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.14GHz, Pout=55W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

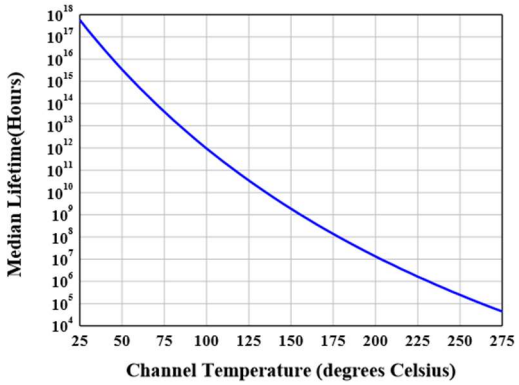


Figure 3: Efficiency and power gain as function of Pout (2.1-2.2GHz Doherty)

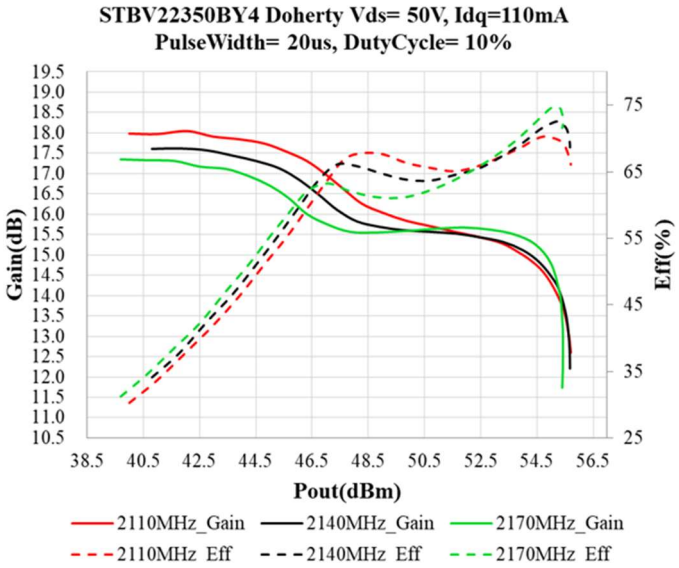


Figure 4: Network analyzer output, S11 and S21 (2.1-2.2GHz Doherty)

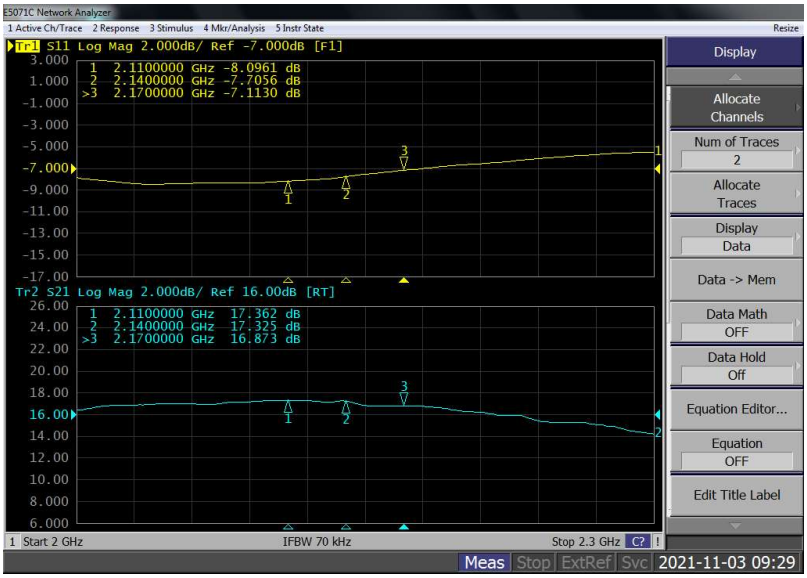


Figure 5: Picture of application board Doherty circuit for 2.1-2.2GHz

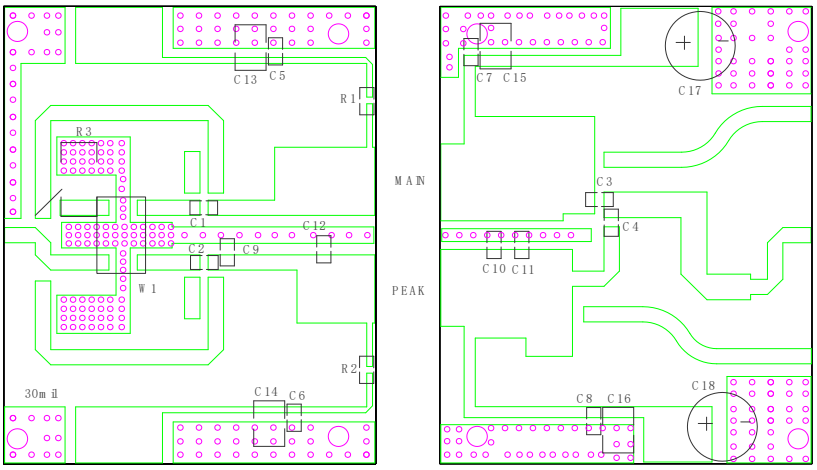


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 30mils)

Designator	Comment	Footprint	Quantity
C1, C2, C4, C5, C6, C7, C8	15pF	0805	7
C3	2 pF	0805	1
C11, C12	0.5 pF	0603	2
C9, C10	1 pF	0603	1
C13, C14, C15, C16	10 uF/100V	1210	4
C17, C18	100 uF/63V		2
R1, R2	10 Ω	0603	2
R3	51 Ω	2512	1
W1	HC2100P03	5.08x6.35mm	1

Figure 6: Efficiency and power gain as function of Pout (1.8-1.9GHz Doherty)

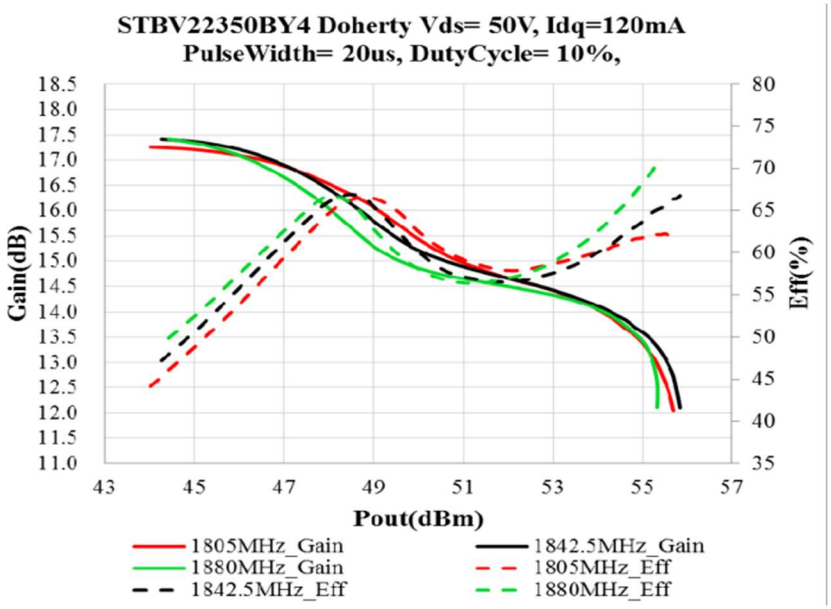


Figure 7: Network analyzer output, S11 and S21 (1.8-1.9GHz Doherty)

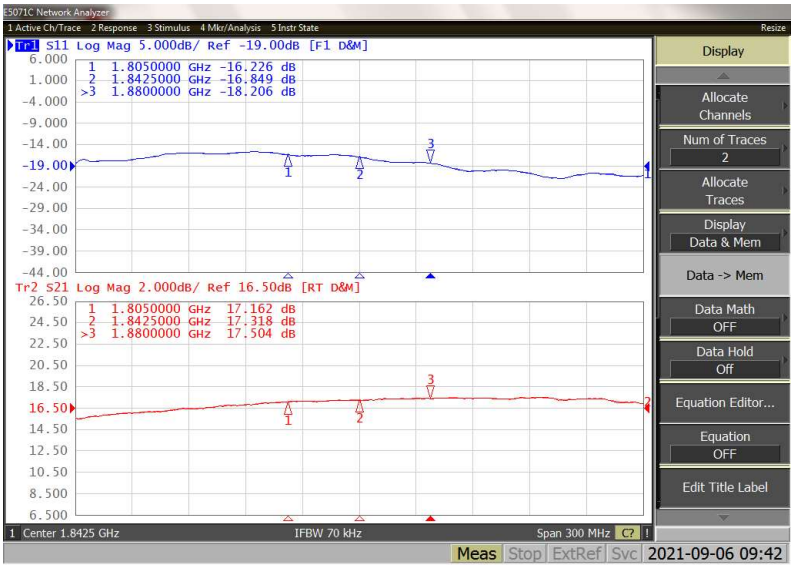


Figure 8: Picture of application board Doherty circuit for 1.8-1.9GHz

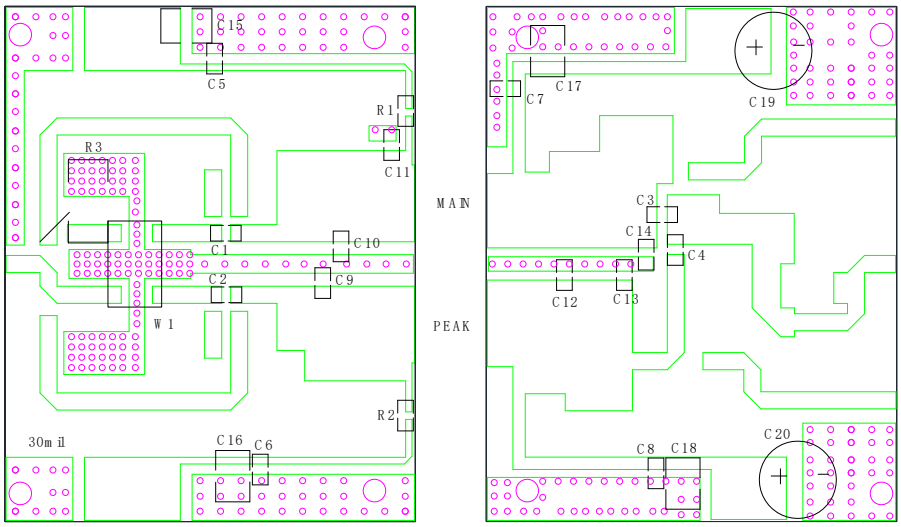


Table 5. Bill of materials of application board (PCB layout upon request, RO4350B 30mils)

Designator	Comment	Footprint	Quantity
C1, C2, C5, C6, C7, C8	27pF	0805	6
C3	6.8F	0805	1
C4	15 pF	0805	1
C9, C13	1.0 pF	0603	2
C10, C11, C14	0.5 pF	0603	3
C12	2.7 pF	0603	1
C15, C16, C17, C18	10 uF/100V	1210	4
C19, C20	100 uF/63V		2
R1, R2	10 Ω	0603	2
R3	51 Ω	2512	1
W1	X3C19P1-03S	5.08x6.35mm	1

Figure 9: Efficiency and power gain as function of Pout (758-821MHz Doherty)

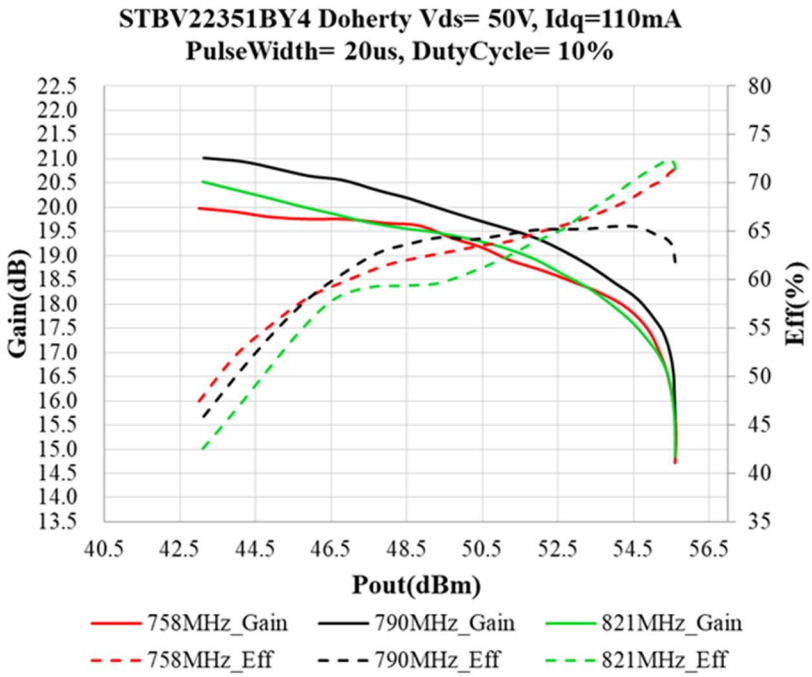


Figure 10: Network analyzer output, S11 and S21 (758-821MHz Doherty)

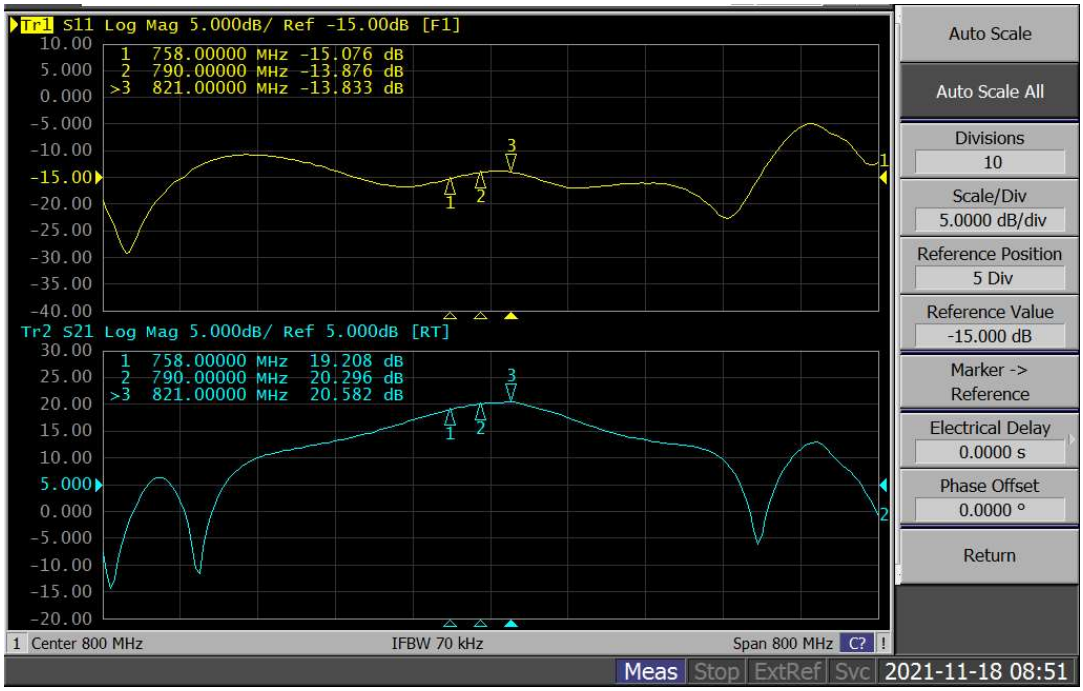


Figure 11: Picture of application board Doherty circuit for 758-821MHz Doherty

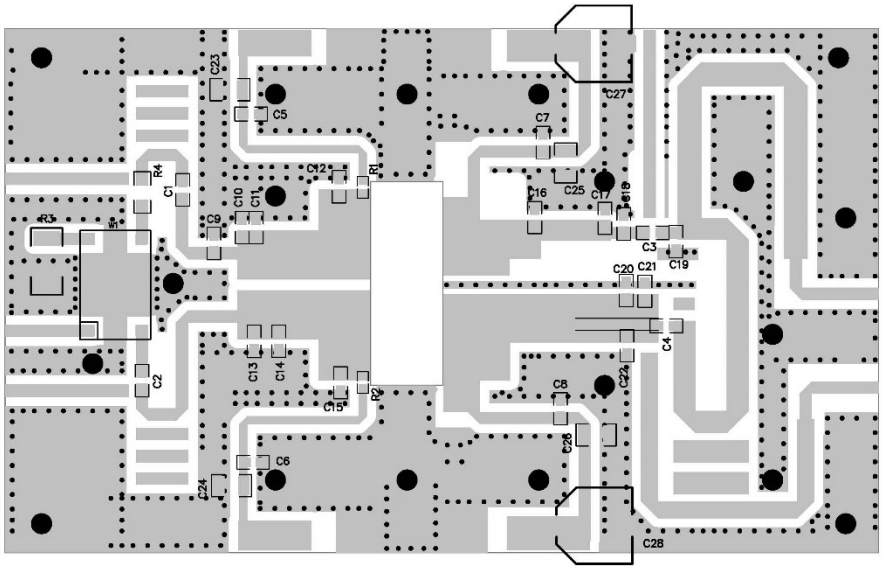
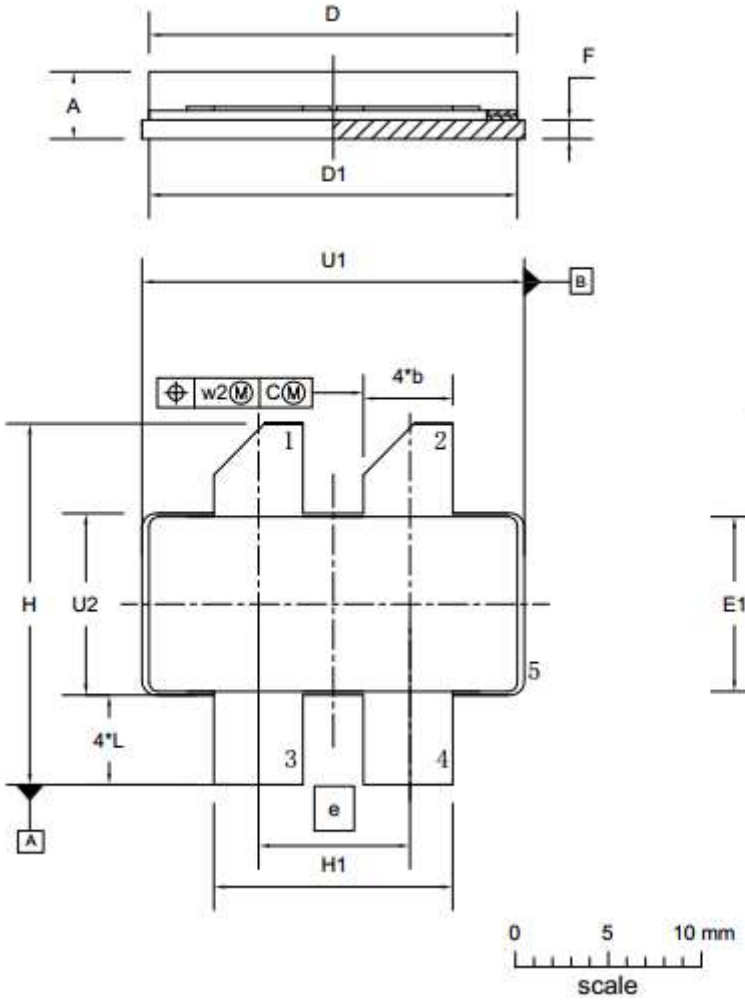


Table 6. Bill of materials of application board (PCB layout upon request, RO4350B 30mils)

Designator	Comment	Footprint	Quantity
C1, C2, C10, C20	6.8pF	0805	4
C3, C4, C5, C6, C7, C8	68pF	0805	6
C9, C11, C14, C16, C17, C18, C21, C22	2pF	0805	8
C12, C13, C15	10pF	0805	3
C19	2.4pF	0805	1
C23, C24, C25, C26	10uF	1210	4
C27, C28	220uF/63V	10*10	2
R1, R2	10R	0603	2
R3	51R	2512	1
R4	5R	1206	1
W1	HC0650A03	8.89x14.22mm	1

Earless Flanged Ceramic Package; 4 leads



Drain		Gate		Source
1	2	3	4	5

UNIT	A	b	c	D	D_1	e	E	E_1	F	H	H1	L	Q	U_1	U_2	W_1	W_2
mm	4.72 3.43	4.67 4.93	0.15 0.08	20.02 19.61	19.96 19.66	7.90	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	12.98 12.73	5.33 4.32	1.70 1.45	20.70 20.45	9.91 9.65	0.25	0.51
inches	0.186 0.135	0.194 0.184	0.006 0.003	0.788 0.772	0.786 0.774	0.311	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.511 0.501	0.210 0.170	0.067 0.057	0.815 0.805	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B4					03/12/2013

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2021/8/23	V1.0	Preliminary Datasheet Creation
2021/9/6	V1.1	Add 1.8GHz Doherty data
2021/11/3	V1.2	Upgrade to STBV22351BY4 from STBV22350BY4
2021/11/18	V1.3	Add 800MHz application data

Application data based on: LSM-21-17/20

Notice

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

"Typical" parameter is the average values expected by Innogration 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.

Innogration 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 Innogration 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 Innogration and authorized distributors