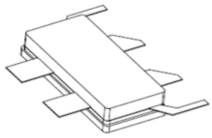
Gallium Nitride 50V, 360W,3.3-3.8GHz RF Power Transistor

Description

STBV38360BY4V



The STBV38360BY4V is a 360-watt, internally matched GaN HEMT, designed for 5G cellular applications with frequencies from 3.3-3.8GHz, enabled by wide band VBW capability to support IBW up to 200MHz..

It can be configured as asymmetrical Doherty for 4G or 5G application, delivering 45 to 55W average power, according to normal 8 to 9dB back off.

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

- Typical 3.4-3.8GHz Doherty Pulsed CW and 1C W--CDMA Characterization Performance:

V_{DD} = 50 Vdc, I_{DQA} = 290 mA, V_{GSB} = –5.5Vdc,

(1)Pulsed condition: 100us and 10%,

(2)1C WCDMA; Signal PAR = 10 dB @ 0.01% Probability on CCDF.

Freq (GHz)	Pulse CW Signal(1)			Pavg=47dBm WCDMA Signal(2)		
	P1-Gain (dB)	P5 (dBm)	P5 (W)	Gp (dB)	Eff (%)	ACPR5M (dBc)
3.4	12.25	56.55	451.7	12.41	47.75	-27.68
3.5	12.00	56.52	448.7	12.42	48.52	-30.70
3.6	12.07	56.50	446.8	12.53	47.42	-30.96
3.7	12.33	56.30	425.6	12.77	46.06	-32.06
3.8	12.26	55.72	373.2	12.46	46.48	-34.32

- Typical 3.3-3.6GHz Doherty Pulsed CW and 1C W--CDMA Characterization Performance:

V_{DD} = 50 Vdc, I_{DQA} = 150 mA, V_{GSB} = –5.4Vdc,

(1)Pulsed condition: 100us and 10%,

Freq (GHz)	Pulse CW Signal(1)			Pavg=47dBm WCDMA Signal(2)		
	P1-Gain (dB)	P3 (dBm)	P3 (W)	Gp (dB)	Eff (%)	ACPR5M (dBc)
3.3	11.67	55.93	391.3	12.0	46.7	-29.2
3.45	11.4	56.11	408.8	11.8	48.2	-31.9
3.6	11.89	55.64	366.8	11.8	46.8	-34.7

Applications

- Asymmetrical Doherty amplifier within N78 5G band and B42 4G band
- S band power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

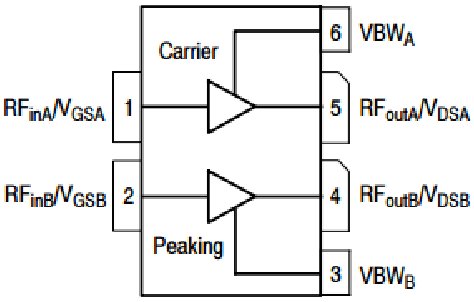
Turning the device ON

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



(Top View)

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	51	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, Pout=50W, 3.6GHz Doherty application board	$R_{\theta JC}$	1.4	°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=17mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 17mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=290mA, 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	VGS=-8V; IDS=34mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 34mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=580mA Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.6GHz, Pout=50W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

3.4-3.8GHz

Figure 2: Intermodulation Distortion Products versus Two--Tone Spacing

Vdd=50V, Pout=47dBm, Center Frequency=3.5GHz

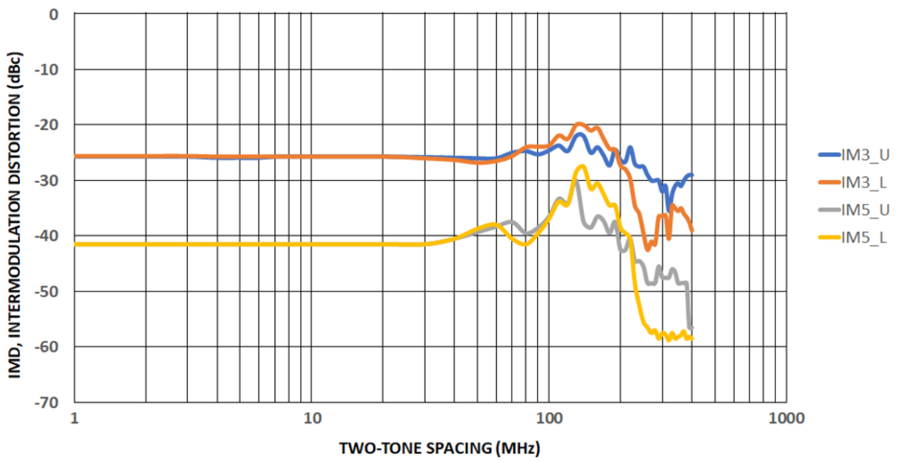


Figure 3: Efficiency and power gain as function of Pout (3.4-3.8GHz Doherty)

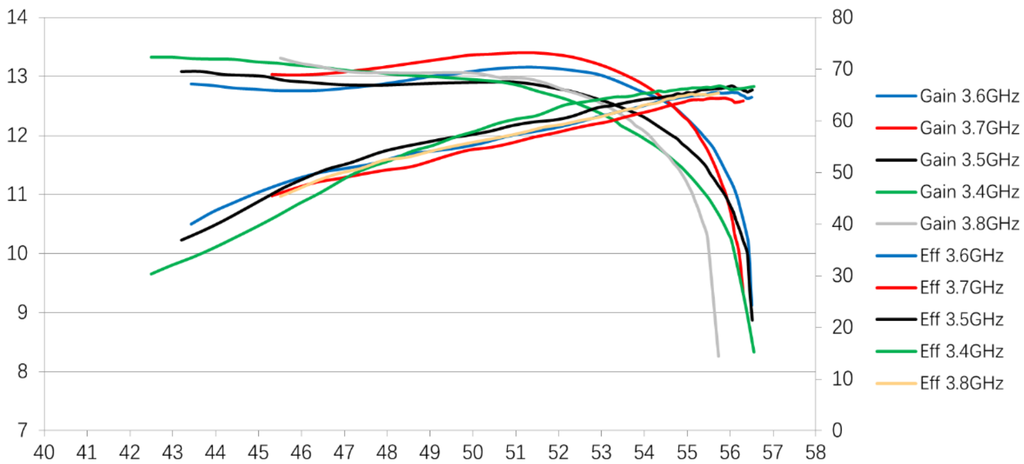


Figure 4: Network analyzer output, S11 and S21 (3.4-3.8GHz Doherty)

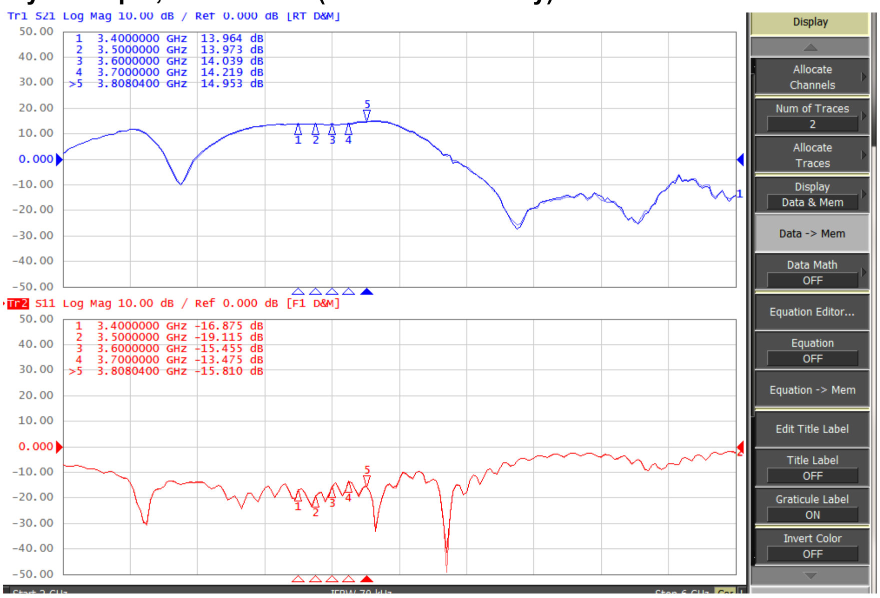


Figure 5: Picture of application board Doherty circuit for 3.4-3.8GHz

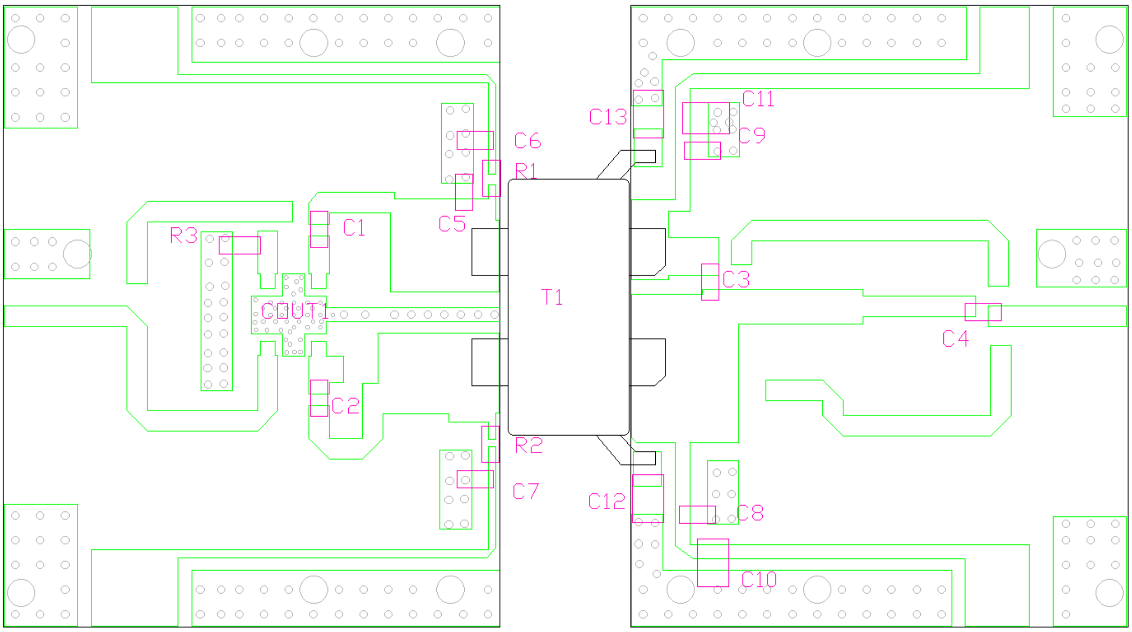


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 30mils)

Part	Quantity	Description	Part Number	Manufacture
C1,C2,C4,C6, C7,C8,C9	7	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C3	1	1.0pFHigh Q Capacitor	ATC600F1R0	ATC
C5	1	0.7pFHigh Q Capacitor	251SHS0R7BSE	TEMEX
C10,C11,C12,C13	4	10uF MLCC	GRM32EC72A106ME05	Murata
R1,R2	2	10Ω Power Resistor	ESR03EZPF100	ROHM
R3	1	51Ω Power Resistor	S1206N	RN2
COUT1	1	3 dB Bridge	XC3500P-03S	ANAREN
T1	1	360W GaN Dual Transistor	STBV38360BY4V	Innogration

3.3-3.6GHz

Figure 6: Efficiency and power gain as function of Pout (3.3-3.6GHz Doherty)

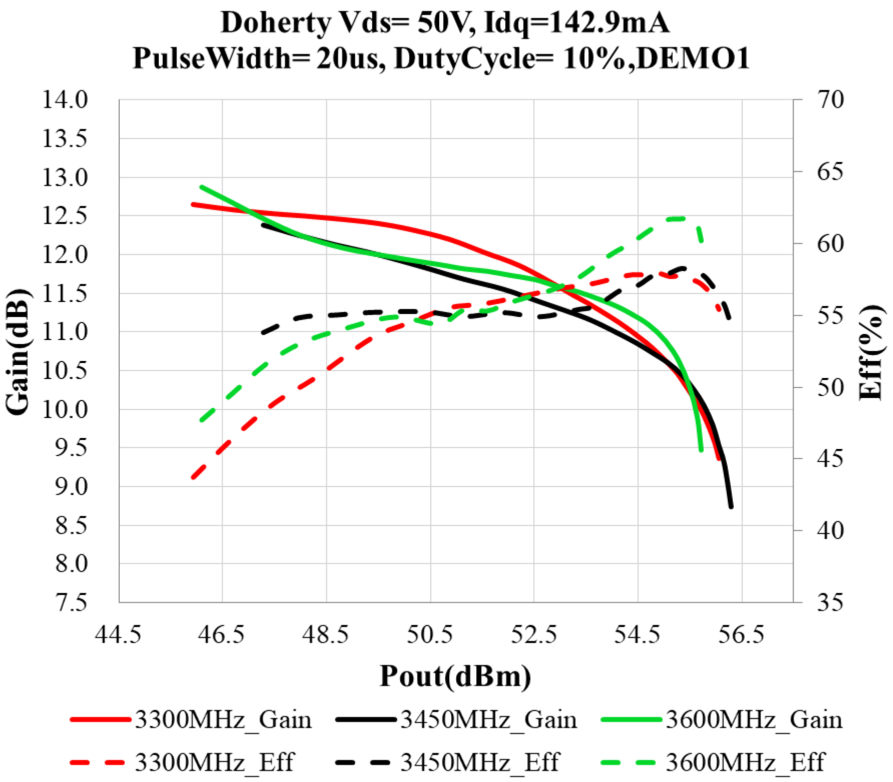


Figure 7: Network analyzer output, S11 and S21 (3.3-3.6GHz Doherty)

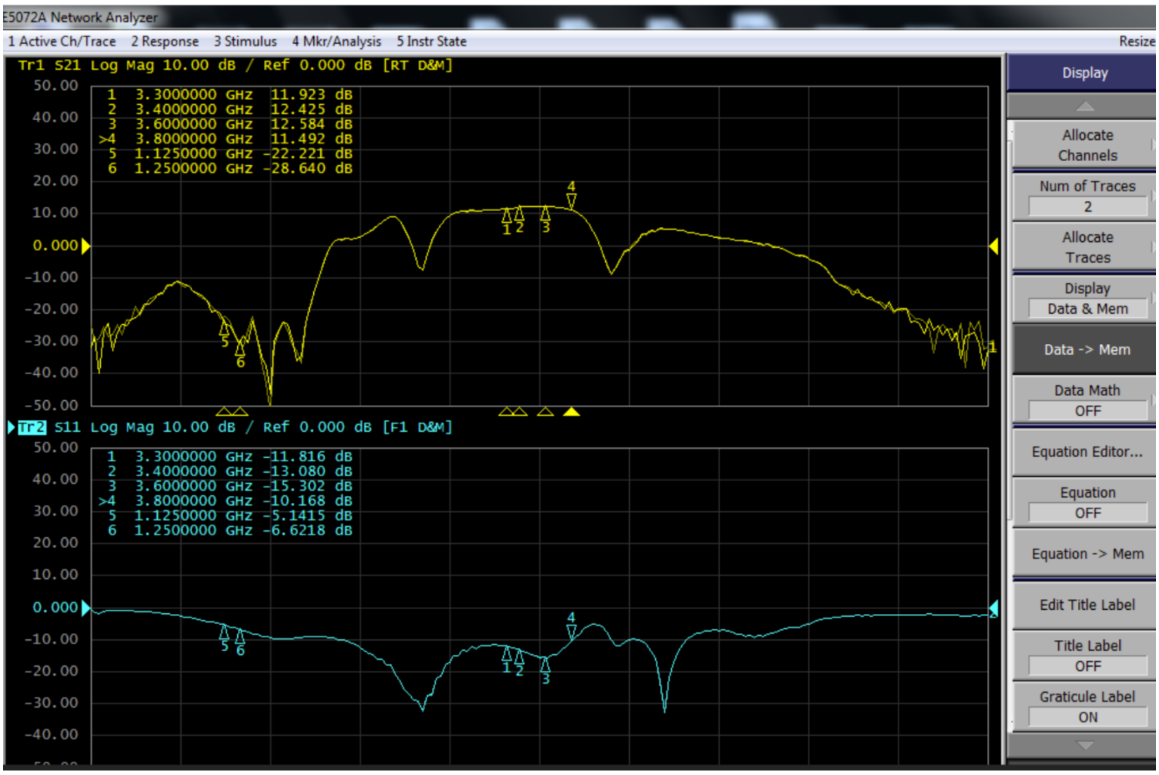


Figure 8: Picture of application board Doherty circuit for 3.3-3.6GHz

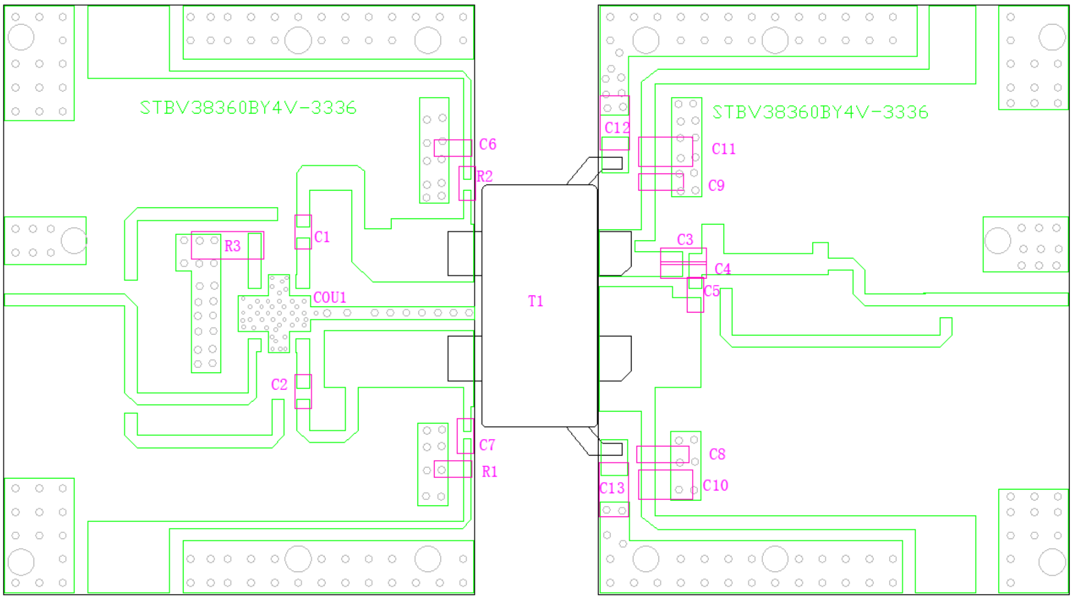
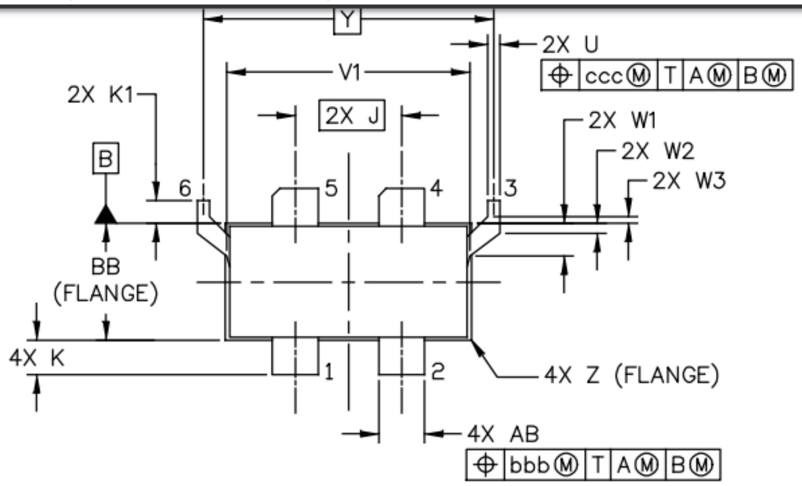
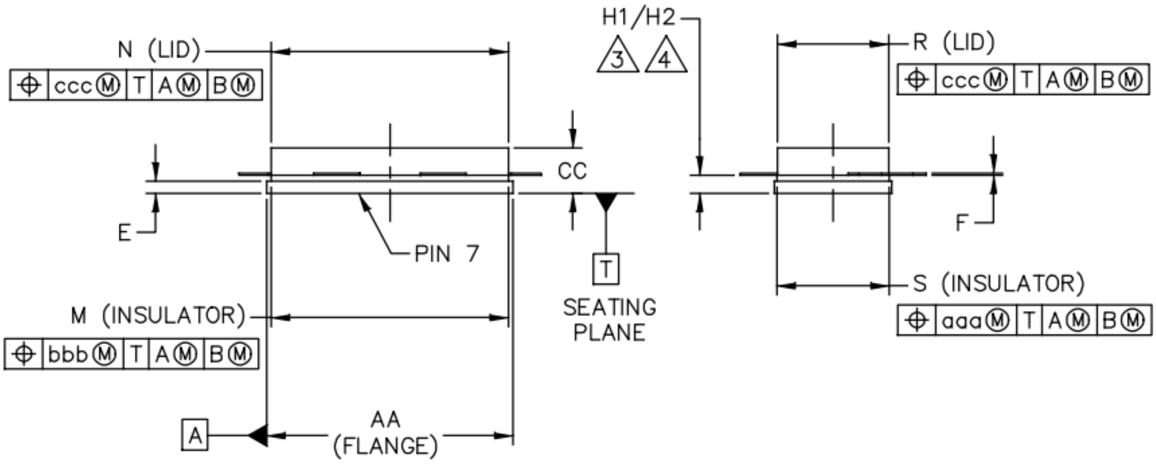


Table 5. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Part	Quantity	Description	Part Number	Manufacture
C1,C2,C6, C7,C8,C9	6	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C3,C4	2	0.8pFHigh Q Capacitor	251SHS0R8BSE	TEMEX
C5	1	3.9pFHigh Q Capacitor	251SHS3R9BSE	TEMEX
C10,C11,C12,C13	4	10uF MLCC	GRM32EC72A106ME05	Murata
R1,R2	2	10Ω Power Resistor	ESR03EZPF100	ROHM
R3	1	51Ω Power Resistor	RFR50-20CT0421B	YT
COU1	1	3 dB Bridge	XC3500P-03S	ANAREN
T1	1	360W GaN Dual Transistor	STBV38360BY4V	Innogration

Earless Flanged Ceramic Package; 6 leads- BY4V





DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
AA	.805	.815	20.45	20.70	R	.365	.375	9.27	9.53
BB	.380	.390	9.65	9.91	S	.365	.375	9.27	9.53
CC	.125	.170	3.18	4.32	U	.035	.045	0.89	1.14
E	.035	.045	0.89	1.14	V1	.795	.805	20.19	20.45
F	.004	.007	0.10	0.18	W1	.0975	.1175	2.48	2.98
H1	.057	.067	1.45	1.70	W2	.0225	.0425	0.57	1.08
H2	.054	.070	1.37	1.78	W3	.0125	.0325	0.32	0.83
J	.350 BSC		8.89 BSC		Y	.956 BSC		24.28 BSC	
K	.0995	.1295	2.53	3.29	Z	R.000	R.040	R0.00	R1.02
K1	.070	.090	1.78	2.29	AB	.145	.155	3.68	3.94
M	.774	.786	19.66	19.96	aaa	.005		0.13	
N	.772	.788	19.61	20.02	bbb	.010		0.25	
					ccc	.015		0.38	

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/5/27	V1.0	Preliminary Datasheet Creation
2026/2/27	V1.1	Change the lower end to 3.3GHz with 3.3-3.6GHz application data added

Application data based on LWH-22-17/LWH-26-03

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