

GaN Power Transistors

H007C11B

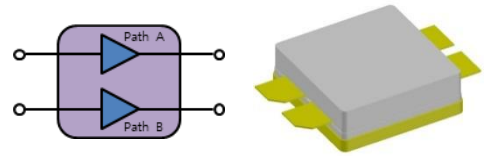


Product Features

- Operating Frequency 2000~2500MHz
- 220 W Saturated Power @ 48V
- 55% Drain Efficiency @ 53dBm
- Internally Pre-Matched
- Push-Pull
- GaN on SiC Technology

Applications

- 2-Way Private Radio
- Broadband Amplifier
- Cellular Infrastructure
- Test Instrumentation
- CW Amplifier



Description

H007C11B is a 220W, GaN-on-SiC RF transistor designed for broadband amplifier, cellular infrastructure, and test instrumentation applications. The H007C11B provides 220W saturated output power with 55% drain efficiency at 48V across 2000MHz to 2500MHz. Its internally pre-matched push-pull configuration enables high-power broadband performance and simplified amplifier implementation, making it suitable for 2-way private radio, broadband, cellular, test instrumentation, and CW amplifier applications.

Typical CW Output Power Performance ($V_{DS} = +48V$, $T_c = 25^\circ C$, 50 Ω)

Frequency [MHz]	Output Power ^{*1}				
	Signal Type	Input Power [Watt]	Output Power [Watt]	Large Signal Gain [dB]	Drain Efficiency [%]
2000	CW	11.5	225	13.0	53.8
2250		11.5	229	13.1	55.8
2500		11.5	207	12.6	57.5

Note

*1 Measured in the H007C11B Push pull board amplifier circuit, under Continuous Wave signal. Output power with input power fixed at 11.5Watt.

Absolute Maximum Ratings

Rating	Symbol	Value	Unit	Condition
Drain to Source Voltage	V_{DSS}	150	V	$T_c = 25^\circ C$
Gate to Source Voltage	V_{GS}	-10, +2	V	$T_c = 25^\circ C$
Operating Voltage	V_{DD}	52	V_{DC}	
Storage Temperature	T_{STG}	-60, +125	$^\circ C$	
Case Operating Temperature	T_c	-40, +150	$^\circ C$	
Operating Junction Temperature ^{*1}	T_J	225	$^\circ C$	
Soldering Temperature ^{*2}	T_s	245	$^\circ C$	

Note

*1 Continuous use at maximum temperature will affect MTTF.

*2 Refer to the Application Note(AN-002) on soldering - "Solder Condition for RFHIC's GaN Device"

Thermal Characteristics

Rating	Symbol	Value	Unit	Condition
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.75 ^{*1}	$^\circ C/W$	$T_c = 85^\circ C$

Note

*1 Measured for the H007C11B at dissipation power is 80W.

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Electrical Characteristics (TC=25 °C unless otherwise noted)

Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
DC Characteristics (Path A) *1						
Maximum Forward Gate Current	Tc= 25℃	I _{GMAX}	-	-	16.0	mA
Maximum Drain Current *2	Tc= 25℃	I _{DMAX}	-	-	6.0	A
Power Dissipation	Tc= 85℃	P _{DMAX}	-	-	80.0	W
Gate Threshold Voltage	V _{DS} = 10V	V _{GS(TH)}	-3.80	-3.00	-2.30	V _{DC}
	I _D = 14.4mA					
Gate Quiescent Voltage	V _{DS} = 48V	V _{GS(Q)}	-3.75	-2.60	-2.25	V _{DC}
	I _D = 400mA					
Drain-Source Breakdown Voltage	V _{GS} = -8V	V _{BR}	150	-	-	V
	I _D = 14.4mA					
Saturated Drain Current *3	V _{DS} = 6V	I _{DS}	12.0	14.4	-	A
	V _{GS} = 2V					
Gate Leakage Current	V _{GS} = -8V	I _{GLKG150}	-4.5	-	-	mA
	V _{DS} = 150V					
Drain Leakage Current	V _{GS} = -8V	I _{DLKG150}	-	-	5.8	mA
	V _{DS} = 150V					
DC Characteristics (Path B) *1						
Maximum Forward Gate Current	Tc= 25℃	I _{GMAX}	-	-	16.0	mA
Maximum Drain Current *2	Tc= 25℃	I _{DMAX}	-	-	6.0	A
Power Dissipation	Tc= 85℃	P _{DMAX}	-	-	80.0	W
Gate Threshold Voltage	V _{DS} = 10V	V _{GS(TH)}	-3.80	-3.00	-2.30	V _{DC}
	I _D = 14.4mA					
Gate Quiescent Voltage	V _{DS} = 48V	V _{GS(Q)}	-3.75	-2.60	-2.25	V _{DC}
	I _D = 400mA					
Drain-Source Breakdown Voltage	V _{GS} = -8V	V _{BR}	150	-	-	V
	I _D = 14.4mA					
Saturated Drain Current *3	V _{DS} = 6V	I _{DS}	12.0	14.4	-	A
	V _{GS} = 2V					
Gate Leakage Current	V _{GS} = -8V	I _{GLKG150}	-4.5	-	-	mA
	V _{DS} = 150V					
Drain Leakage Current	V _{GS} = -8V	I _{DLKG150}	-	-	5.8	mA
	V _{DS} = 150V					

Note

*1 Measured on wafer prior to packaging.

*2 Current Limit for long term, reliable operation.

*3 Scaled from PCM data.

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RF Characteristics

Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
RF Characteristics (F=2250MHz unless otherwise noted)						
Output Power ^{*1}	V _{DS} = 48V	P _{OUT}	200	220	-	W
	I _D = 800mA					
	P _{IN} = 40.5dBm					
Power Gain ^{*1}	V _{DS} = 48V	G _{BR}	12.0	15.0	-	dB
	I _D = 800mA					
	P _{IN} = 40.5dBm					
Drain Efficiency	V _{DS} = 48V	η	50.0	55.0	-	%
	I _D = 800mA					
	P _{IN} = 40.5dBm					
Output Mismatch Stress ^{*2}	V _{DS} = 48V	VSWR	-	-	10 : 1	ψ
	I _D = 800mA					
	P _{IN} = 40.5dBm					

Note

*1 Measured in the H007C11B Push pull board amplifier circuit, under Continuous wave signal. Output power with input power fixed at 40.5dBm.

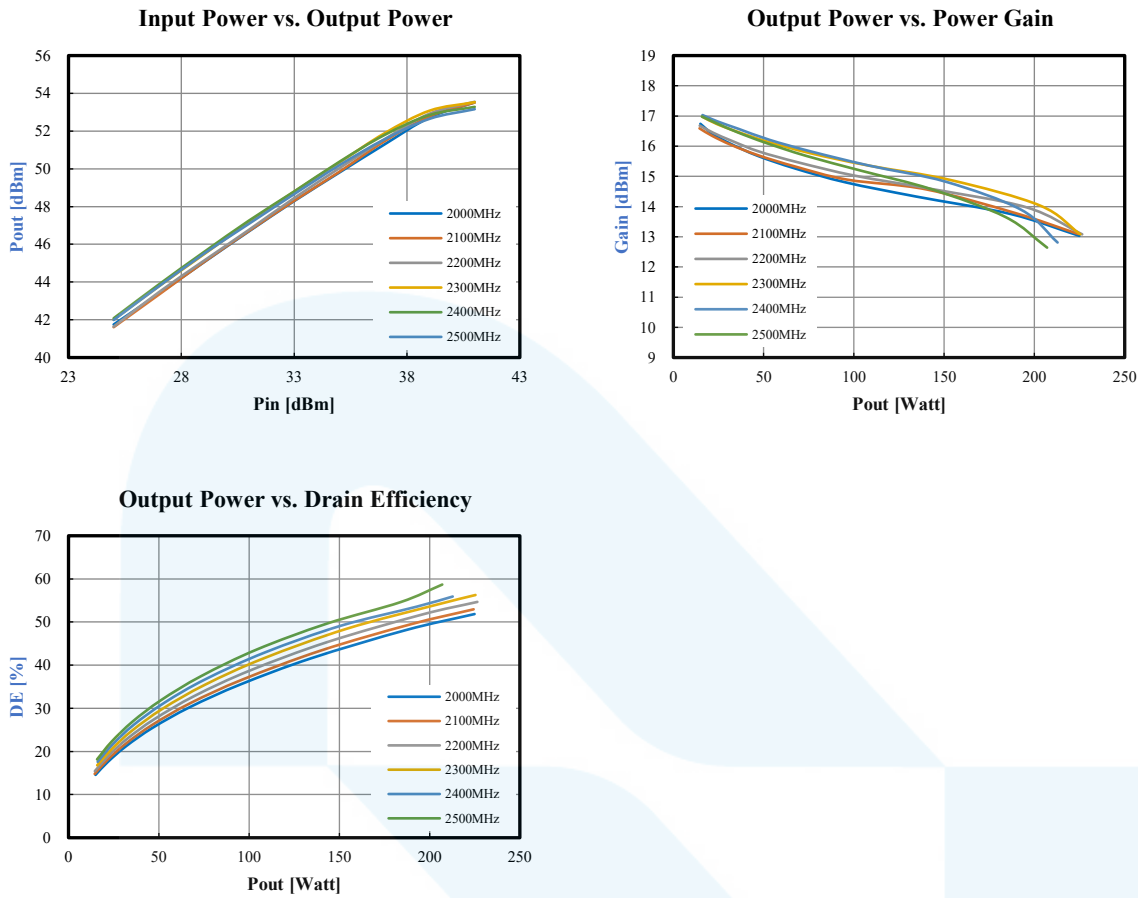
*2 Measured in the H007C11B Push pull test board amplifier circuit. No damage at all phase angles.

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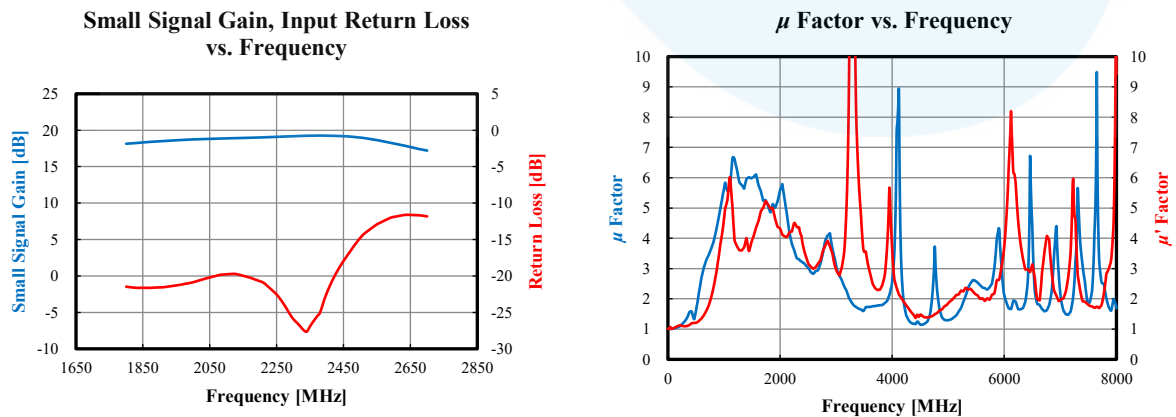


Typical CW Signal Performance (T_c=25°C, Measured in the H007C11B test board amplifier circuit)



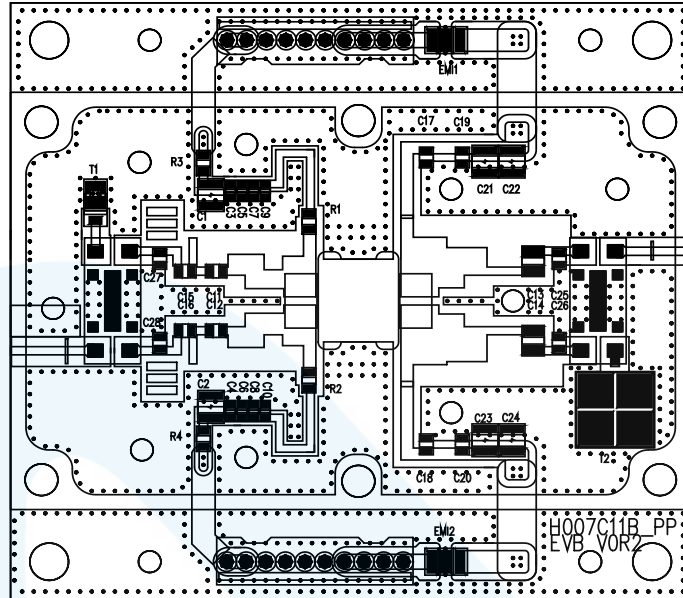
VDS = 48V, Path A Idq=400mA, Path B Idq=400mA

Typical Small Signal Performance (T_c=25°C, Measured in the H007C11B test board amplifier circuit)



VDS = 48V, Path A Idq=400mA, Path B Idq=400mA

Test Board Component Layout



Parts List

Part	Description	Part Number	Manufacturer
C1, C2	47uF Polymer Capacitor	TCJB476M010R0070	AVX
C3, C4	1uF Chip Capacitor	GRM188R71C105KA01D	MURATA
C5, C6	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C7, C8	100pF Chip Capacitor	GRM1885C1H101JA01D	MURATA
C9, C10	10pF Chip Capacitor	GRM1885C1H100JA01D	MURATA
C11, C12	4.7pF High Q Capacitor	201 CHA 4R7 BSLE	TEMEX
C13, C14	8.2pF High Q Capacitor	501 CHB 8R2 BSLE	TEMEX
C15, C16	18pF High Q Capacitor	201 CHA 180 JSLE	TEMEX
C17	8.2pF High Q Capacitor	201 CHA 8R2 BSLE	TEMEX
C18	12pF High Q Capacitor	201 CHA 120 JSLE	TEMEX
C19, C20	100pF High Q Capacitor	201 CHA 101 JSLE	TEMEX
C21, C22, C23, C24	10uF MLCC	GRM32EC72A106KE05L	MURATA
C25, C26, C27, C28	0.2pF High Q Capacitor	201 CHA 0R2 BSLE	TEMEX
COU1	Coupler -90 DEG Hybrid	CMX25S03	RN2
COU2	Coupler -90 DEG Hybrid	CMX25S03	RN2
R1, R2	10 ohm Chip Resistor	MCR10 EZHJ 100	ROHM
R3, R4	1R0 ohm Chip Resistor	MCR10 EZHJ 1R0	ROHM

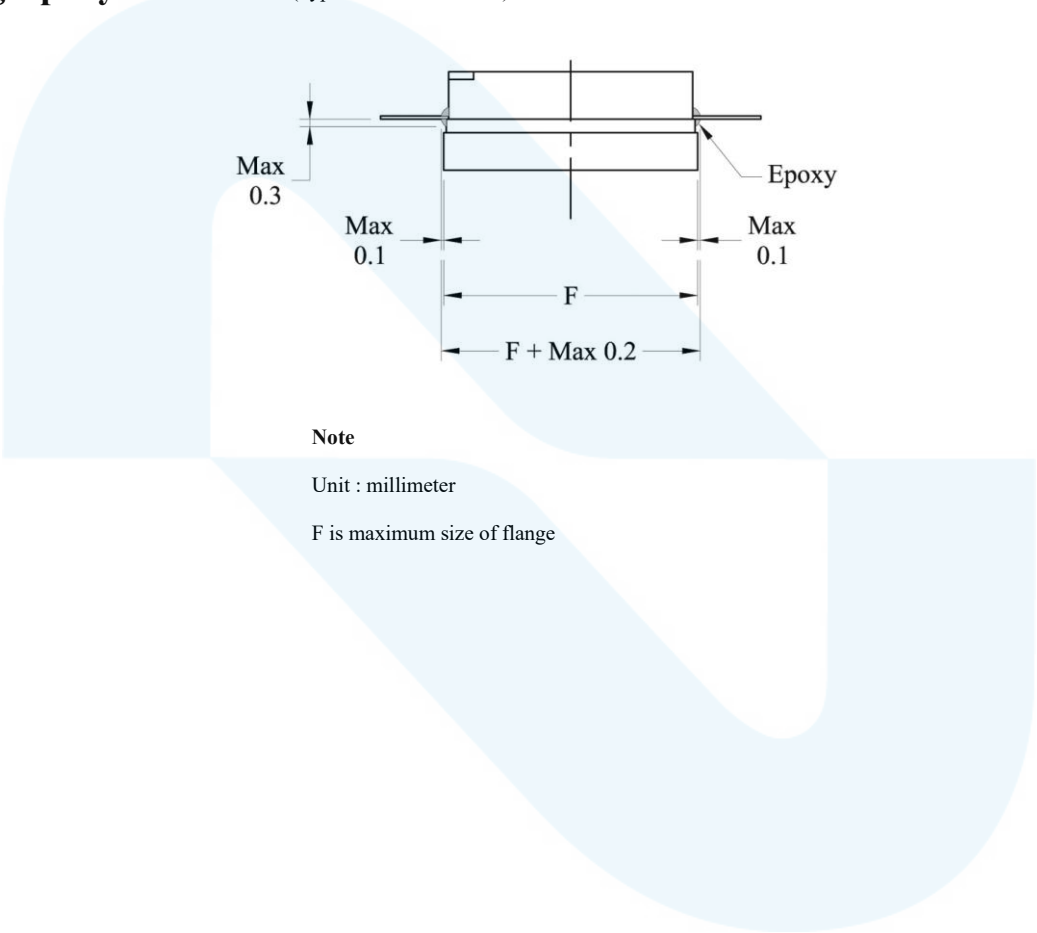
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T1	50 ohm Power Resistor	S1020N	RN2
T2	50 ohm Power Resistor	T3737NB	RN2
EMI1,EMI2	EMI FILTER	CTH32R102S20A-TM	MARUWA
TR1	GaN Transistor	H007C11B	RFHIC
PCB	$\epsilon r=3.48 \pm 0.05, 0.020^{\circ}(0.508mm)$	RO4350B	ROGERS
CON1, CON2	DC Connector	LW0640-10	HANLIM

Sealing Epoxy Tolerance (Type: RF12001DHKR3)

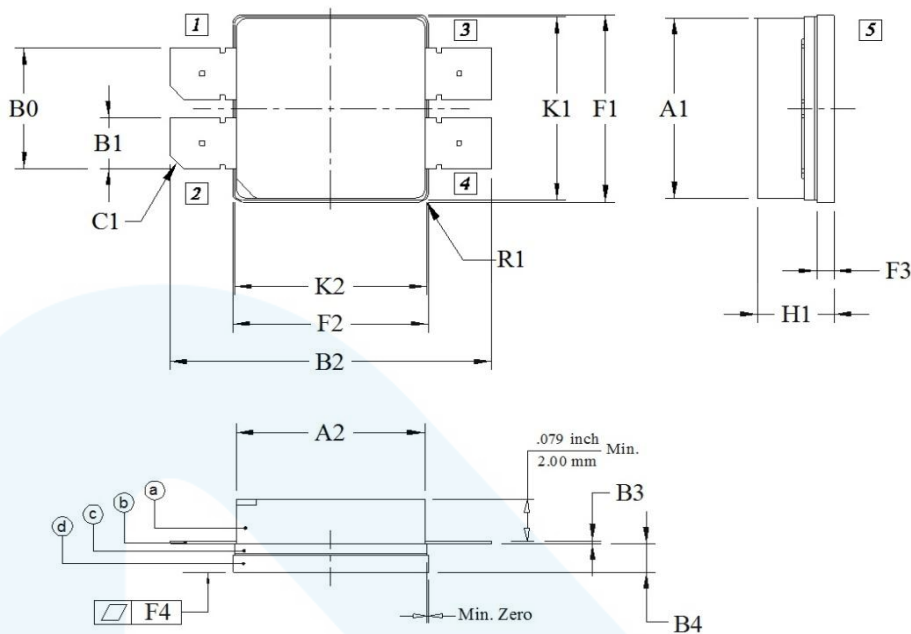


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Package Dimensions (Type: RF12001DHKR3)



Pin Description	
Pin No	Function
1	Path A Gate
2	Path B Gate
3	Path A Drain
4	Path B Drain
5	Source

- Ⓐ- Lid
- Ⓑ- Lead Frame
- Ⓒ- Ceramic Ring
- Ⓓ- Flange

Dim.	INCH			MILLIMETER		
	MIN	TYP	MAX	MIN	TYP	MAX
A1	.379	.384	.389	9.63	9.76	9.89
A2	.379	.384	.389	9.63	9.76	9.89
B0	.253	.258	.263	6.43	6.56	6.69
B1	.104	.109	.115	2.65	2.78	2.91
B2	.637	.657	.677	16.19	16.69	17.19
B3	.003	.005	.007	0.08	0.13	0.18
B4	.057	.062	.067	1.45	1.57	1.70
C1 (Chamfer)	.024	.030	.035	0.62	0.75	0.88
F1	.395	.400	.405	10.03	10.16	10.29
F2	.395	.400	.405	10.03	10.16	10.29
F3	.031	.036	.041	0.79	0.92	1.05
F4	-	.001	-	-	0.03	-
H1	.135	.156	.178	3.42	3.97	4.52
K1	.387	.392	.397	9.83	9.96	10.09
K2	.387	.392	.397	9.83	9.96	10.09
R1 (Radius)	.016	.020	.024	0.40	0.50	0.60

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Revision History

Part Number	Release Date	Version	Description	Data Sheet Status
H007C11B	July, 2024	1.0	Initial release of datasheet	Mass Production



Certification

This product is manufactured by a company that is certified for the AS9100D quality management system.

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