

Preliminary

GaN Power Transistors

RSSEC30N10BN



Package Type : NS-CS01E

Product Features

- Up to 6GHz Operation
- 15W Typical Saturated Power
- 65% Drain Efficiency @ Saturated Power
- 3W Modulation Average Power
- 32% Drain Efficiency @ 34.5dBm
- 28V Operation

Applications

- WiMAX, LTE, WCDMA, GSM
- Broadband Amplifier
- Test Instrumentation
- Multi-Band, Multi-Mode
- Multi-Carrier
- High Efficiency, Doherty Amplifier

Description

The RSSEC30N10BN is a 15 W GaN-on-SiC HEMT power transistor operating from DC up to 6 GHz, housed in RFHIC's NS-CS01E flanged package. Operating at 28 V, the device delivers 15 W typical saturated output power with 65% drain efficiency, and 3 W make the RSSEC30N10BN well suited for WiMAX, LTE, WCDMA, and GSM applications, including broadband amplifiers, test instrumentation, multi-band/multi-mode/multi-carrier systems, and high-efficiency Doherty amplifier designs.

Typical Single-Carrier Pulse, LTE Performance $(V_{DS} = +28V, T_C = 25^\circ C, 50\Omega)$

	CW Peak Power			Average Power ^{*1}		
	Power [W]	Drain Efficiency [%]		Power [W]	Gain [dB]	Drain Efficiency [%]
3500.0	16.7	62.1	3510.0	3	12.6	29.9
3700.0	16.4	73.1	3700.0	3	13.0	34.4
3900.0	15.2	63.5	3890.0	3	12.5	34.6

Note

*1 Measured in the RSSEC30N10BN test board amplifier circuit, under LTE 20MHz, PAR 7.5dB @0.01% probability on CCDF.

Absolute Maximum Ratings

Rating	Symbol	Value	Unit	Condition
Drain to Source Voltage	V_{DSS}	120	V	$T_C = 25^\circ C$
Gate to Source Voltage	V_{GS}	-10, +2	V	$T_C = 25^\circ C$
Operating Voltage	V_{DD}	28	V_{DC}	
Maximum Forward Gate Current	I_{GMAX}	4	mA	$T_C = 25^\circ C$
Maximum Drain Current ^{*1}	I_{DMAX}	1.5	A	$T_C = 25^\circ C$
Power Dissipation	P_{DISS}	14	W	$T_C = 85^\circ C$
Storage Temperature	T_{STG}	-65, +150	$^\circ C$	
Case Operating Temperature	T_C	-40, +150	$^\circ C$	30 seconds
Operating Junction Temperature ^{*2}	T_J	225	$^\circ C$	
Soldering Temperature ^{*3}	T_S	245	$^\circ C$	

Note

*1 Current Limit for long term, reliable operation.

*2 Continuous use at maximum temperature will affect MTTF.

*3 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	$R_{\theta JC}$	8.00 ^{*1}	$^\circ C/W$	$T_C = 85^\circ C$

Note

*1 Measured for the RSSEC30N10BN at dissipation power is 14W.

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Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
DC Characteristics ^{*1}						
Gate Threshold Voltage	V _{DS} = 10V	V _{GS(TH)}	-3.8	-3.2	-2.3	V _{DC}
	I _D = 3.6mA					
Gate Quiescent Voltage	V _{DS} = 28V	V _{GS(Q)}	-	-2.9	-	V _{DC}
	I _D = 200mA					
Saturated Drain Current ^{*2}	V _{DS} = 6V	I _{DS}	2.9	3.5	-	A
	V _{GS} = 2V					
Drain-Source Breakdown Voltage	V _{GS} = -8V	V _{BR}	84	-	-	V
	I _D = 3.6mA					
RF Characteristics (Fc=3700MHz unless otherwise noted)						
Saturated Output Power ^{*3,6}	V _{DS} = 28V	P _{SAT}	10	15	20	W
	I _{DQ} = 200mA					
Pulsed Drain Efficiency ^{*3}	V _{DS} = 28V	η	55.0	65.0	80.0	%
	I _{DQ} = 200mA					
	P _{OUT} = P _{SAT} Pulsed					
Small Signal Gain ^{*7}	V _{DS} = 28V	G _S	12.0	14.0	16.0	dB
	I _{DQ} = 200mA					
	P _{IN} = 0dBm					
Modulated Gain ^{*4}	V _{DS} = 28V	G _p	11.0	13.0	15.0	dB
	I _{DQ} = 200mA					
	P _{OUT} = 34.5dBm					
LTE Linearity ^{*4}	V _{DS} = 28V	ACLR	-45	-35.0	-30.0	dBc
	I _{DQ} = 200mA					
	P _{OUT} = 34.5dBm					
Modulated Drain Efficiency ^{*4}	V _{DS} = 28V	η	25.0	32.0	39.0	%
	I _{DQ} = 200mA					
	P _{OUT} = 34.5dBm					
Output Mismatch Stress ^{*3, 5}	V _{DS} = 28V	VSWR	-	-	10:1	ψ
	I _{DQ} = 200mA					
	P _{OUT} = P _{SAT} Pulsed					

Note

*1 Measured on wafer prior to packaging.

*2 Scaled from PCM data.

*3 Pulse width 100 μsec , Duty Cycle 10%.

*4 Measured in the RSSEC30N10BN test board amplifier circuit, under LTE 20MHz, PAR7.5dB @0.01% probability on CCDF.

*5 Measured in the RSSEC30N10BN test board amplifier circuit. No damage at all phase angles.

*6 Psat is defined as $\Delta P_{out}/\Delta P_{in} < 0.1$, where ΔP_{in} is increased input power, ΔP_{out} is increased output power.

*7 Pin=0dBm

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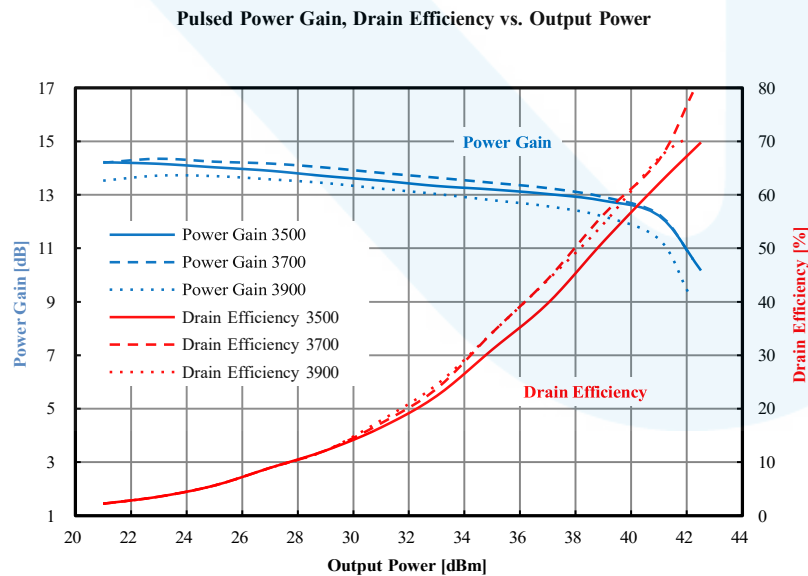
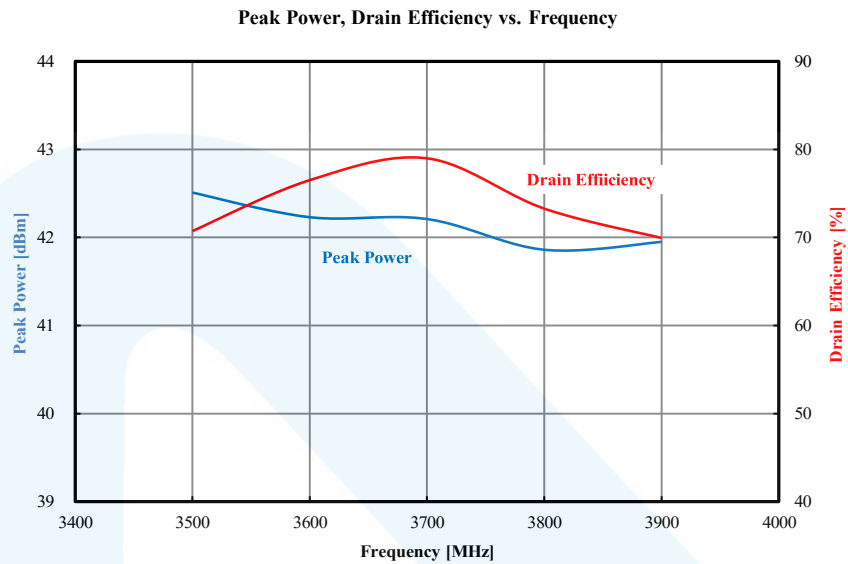
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Typical Pulsed Signal Performance

(Tc=25°C, Measured in the RSSEC30N10BN test board amplifier circuit)



$V_{DS} = 28V$, $I_{DQ} = 200mA$

Pulse Width = 100μsec, Duty Cycle = 10%

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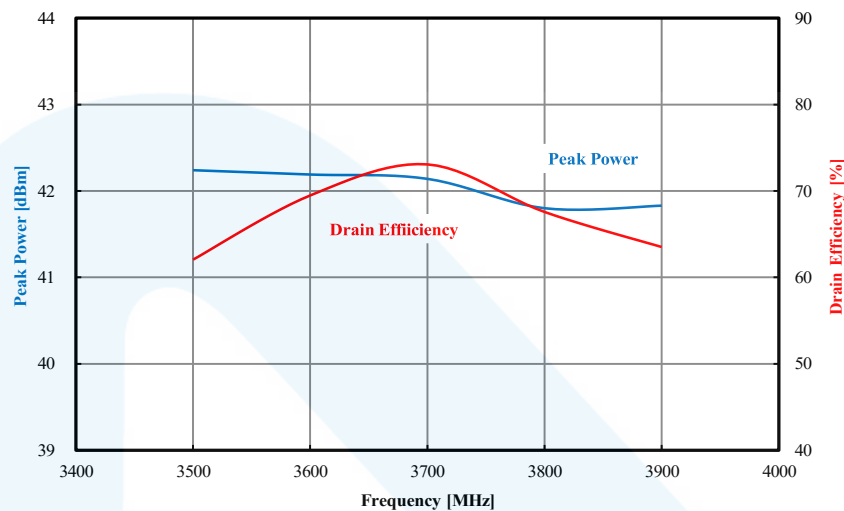
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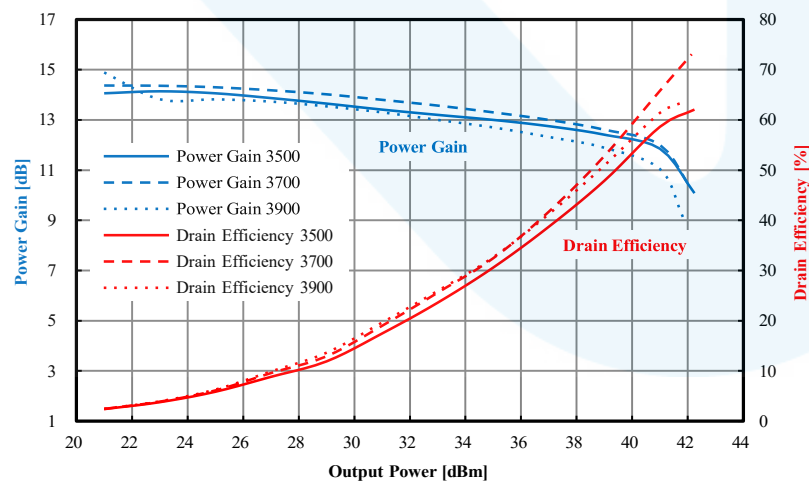
Typical CW Signal Performance

(Tc=25°C, Measured in the RSSEC30N10BN test board amplifier circuit)

CW Peak Power, Drain Efficiency vs. Frequency



CW Power Gain, Drain Efficiency vs. Output Power



$V_{DS} = 25V$, $I_{DQ} = 200mA$

Continuous Wave

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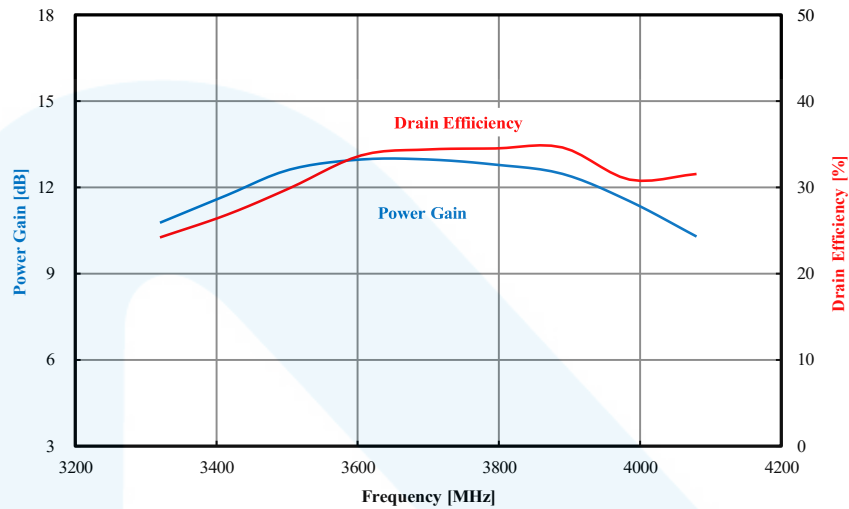
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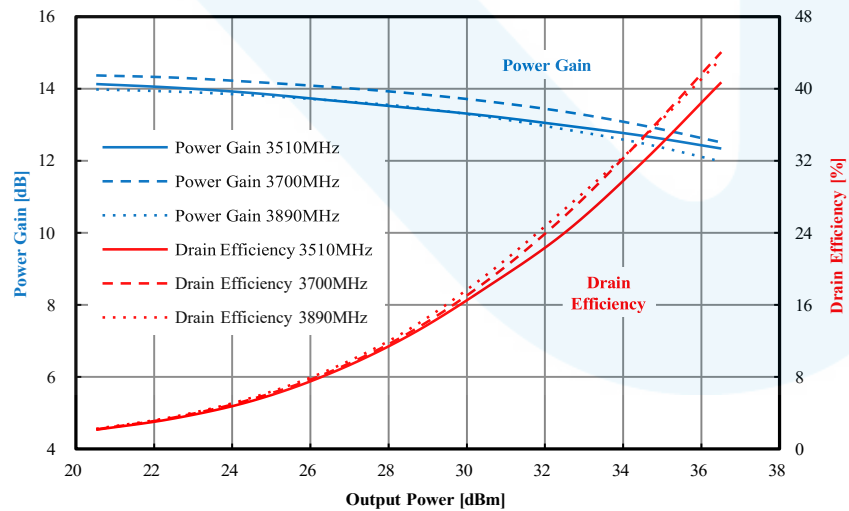
Typical LTE Signal Performance

(Tc=25°C, Measured in the RSSEC30N10BN test board amplifier circuit)

LTE Power Gain, Drain Efficiency, ACLR, PARC vs. Frequency



Power Gain, Drain Efficiency vs. Output Power



$P_{AVG} = 34.5\text{dBm}$,

$V_{DS} = 28\text{V}$,

$I_{DQ} = 200\text{mA}$

LTE 20MHz BW, PAPR=7.5dB @ 0.01% Probability on CCDF

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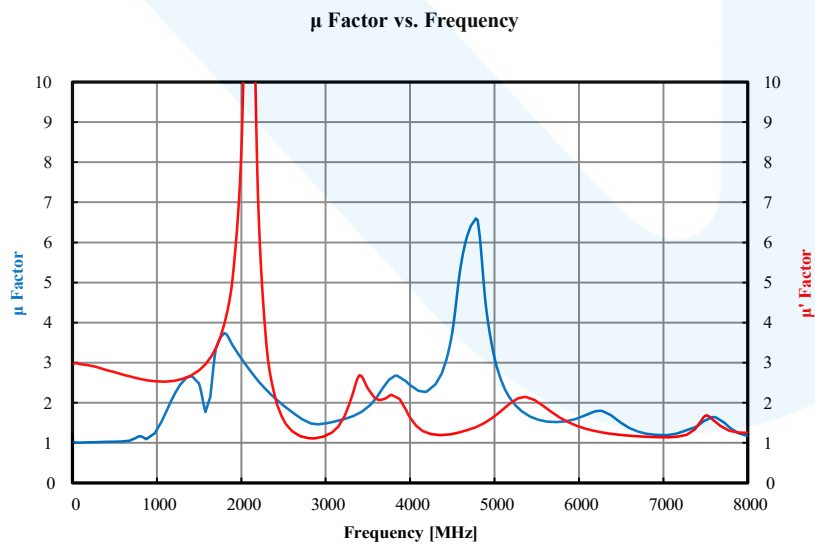
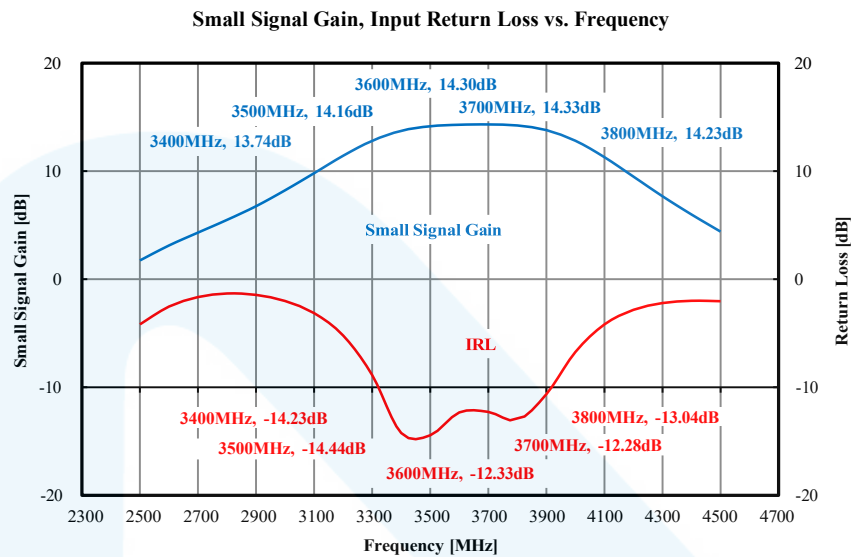
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Typical Small Signal Performance

(Tc=25°C, Measured in the test board amplifier circuit)

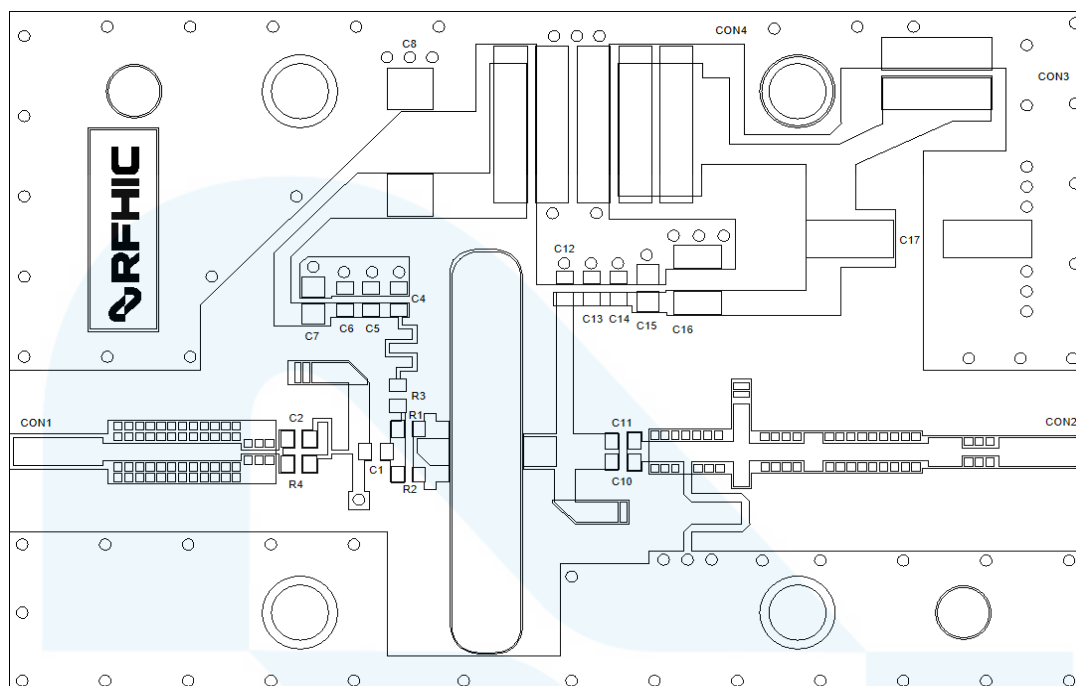


$P_{IN} = 0\text{dBm}$, $V_{DS} = 28\text{V}$, $I_{DQ} = 200\text{mA}$

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Test Board Component Layout

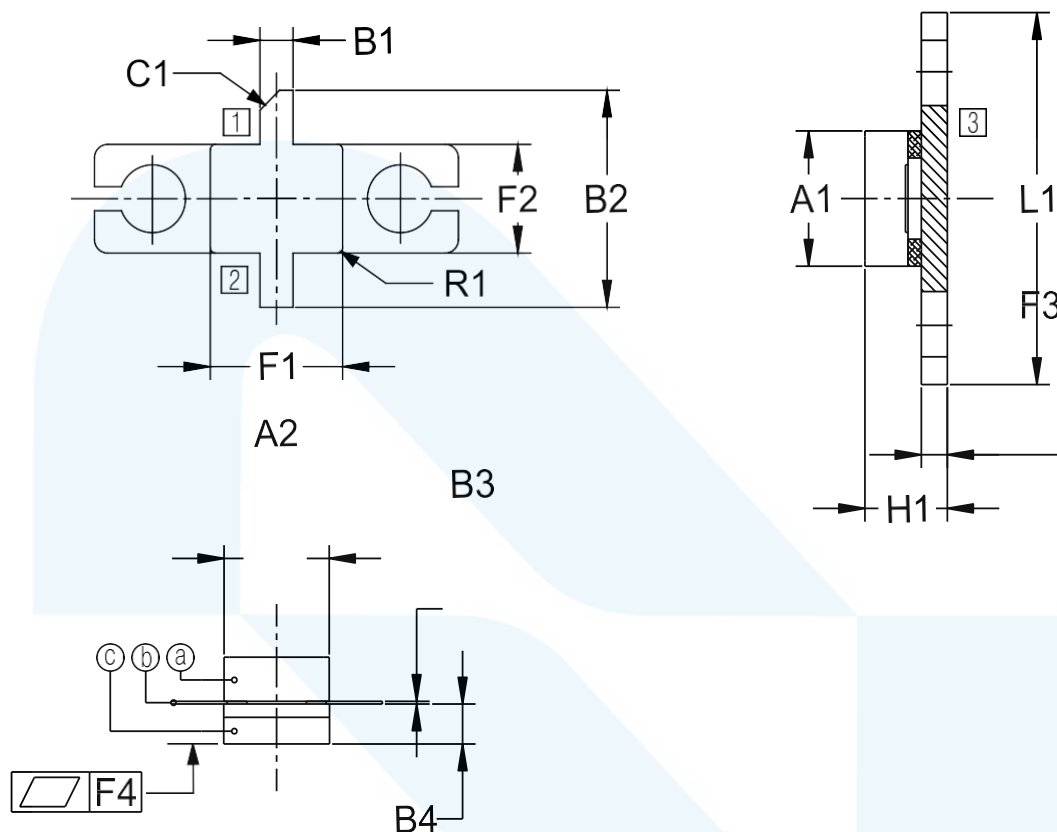


Part	Description	Part Number	Manufacturer
C1	0.5pF High Q Capacitor	600S0R5AT250	ATC
C2	0.8pF High Q Capacitor	600S0R8AT250	ATC
C4, C12	12pF High Q Capacitor	600S120AT250	ATC
C5	1nF Chip Capacitor	GRM188R71H102KA01D	MURATA
C6	10nF Chip Capacitor	GRM188R71H103KA01D	MURATA
C7	4.7uF Chip Capacitor	GRM21BZ71H475KE15K	MURATA
C8	Polymer Capacitor	TCJT106M050	KYOCERA
C10, C11	1pF High Q Capacitor	600S1R0AT250	ATC
C13	39pF High Q Capacitor	600S390AT250	ATC
C14	100pF High Q Capacitor	600S101AT250	ATC
C15	1uF Chip Capacitor	GRM21BC72A105KE01L	MURATA
C16	10uF MLCC	GRM32EC72A106KE05L	MURATA
C17	100uF Aluminum Capacitor	B7VZH100	Lelon
R1, R2	0 ohm Power Resistor	MCR03EZHJ000	ROHM
R3	47 ohm Power Resistor	MCR03EZHJ470	ROHM
R4	100 ohm Power Resistor	MCR03EZHJ101	ROHM
PCB	$\epsilon_r=3.66 \pm 0.05$, 0.020" (0.508mm)	RO4350B	ROGERS Corp.
TR1	13W GaN Transistor	RSSEC30N10BN	RFHIC

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Package Dimensions (Type: NS-CS01E)



Pin-Description	
Pin No	Function
1	Gate
2	Drain
3	Source

- (a)- Lid
- (b)- Lead Frame
- (c)- Flange

Dim.	INCH			MILLIMETER		
	MIN	TYP	MAX	MIN	TYP	MAX
A1	.188	.193	.198	4.780	4.900	5.030
A2	.149	.154	.158	3.780	3.900	4.025
B1	.042	.047	.052	1.070	1.200	1.330
B2	.295	.315	.335	7.500	8.000	8.500
B3	.003	.005	.007	.080	.130	.180
B4	.076	.081	.086	1.930	2.050	2.180
C1 (Chamfer)	.025	.030	.034	.630	.750	.875
F1	.196	.201	.206	4.970	5.100	5.230
F2	.156	.161	.167	3.970	4.100	4.230
F3	.054	.059	.064	1.370	1.500	1.630
F4	-	.001	-	-	.030	-
H1	.122	.144	.165	3.100	3.650	4.200
L1	.536	.550	.564	13.610	13.970	14.320
L2	-	-	-	-	-	-
R1 (Radius)	.004	.008	.012	.100	.200	.300

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Revision History

Part Number	Release Date	Version	Description	Data Sheet Status
RSSEC30N10BN	July, 2026	0.1	Initial Release of datasheet	



Certification

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

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