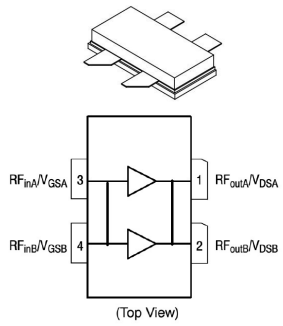
700MHz-1000MHz, 200W, 28V High Power RF LDMOS FETs

Description

The ITCH09200B2-R1 is a 200-watt, internally matched LDMOS FET, designed for CDMA/WCDMA and multicarrier GSM base station applications with frequencies from 700 to 1000 MHz. It Can be used in Class AB/B and Class C for all typical cellular base station modulation formats.

Due to internal connections at input and output, it must be used as single-ended configuration.

ITCH09200B2-R1



- Typical Single-Carrier W-CDMA Performance: V_{DD}=28Volts, I_{DQ}= 1000 mA, P_{out}= 40 Watts Avg., IQ Magnitude Clipping, Channel Bandwidth = 3.84 MHz, Input Signal PAR = 7.5 dB @ 0.01% Probability on CCDF.

Frequency	Gp (dB)	η_D (%)	$ACPR_{5M}$ (dBc)	$ACPR_{10M}$ (dBc)
920 MHz	19.9	26.4	-38.5	-55.4
960 MHz	20.3	28.8	-39.2	-56.4
875 MHz	19.7	26.5	-39	-55

- Typical Performance (On Innogration fixture with device soldered):

V_{DD} = 28 Volts, I_{DQ} = 1000 mA, Pulse CW, Pulse Width=100 us, Duty cycle=10% .

Frequency	Gp (dB)	P_{-1dB} (dBm)	η_D@P_{-1} (%)	P_{-3dB} (dBm)	η_D@P_{-3} (%)
920 MHz	20.1	53.3	54	54.4	59.8
960 MHz	20.4	52.5	57.8	53.6	64.7
875 MHz	21.6	53.1	57.6	54.3	66.7

Features

- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Internally Matched for Ease of Use
- Excellent thermal stability, low HCI drift
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	70	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+32	Vdc
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 T_C= 85°C, T_J=200°C, DC test	$R_{\theta JC}$	0.35	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22--A114)	Class 2

Table 4. Electrical Characteristics (TA = 25 C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DC Characteristics					
Drain-Source Breakdown Voltage (V_{GS}=0V; I_D=100uA)	V_{DSS}	65			V
Zero Gate Voltage Drain Leakage Current (V_{DS} = 28 V, V_{GS} = 0 V)	I_{DSS}			1	μA
Gate--Source Leakage Current (V_{GS} = 6 V, V_{DS} = 0 V)	I_{GSS}			1	μA
Gate Threshold Voltage (V_{DS} = 28V, I_D = 1 mA)	$V_{GS(th)}$		2.2		V
Gate Quiescent Voltage (V_{DD} = 28 V, I_{DQ} = 1000 mA, Measured in Functional Test)	$V_{GS(Q)}$	2.6	3.1	3.6	V
Functional Tests (In Innogration Test Fixture, 50 ohm system) : V_{DD} = 28 Vdc, I_{DQ} = 1000 mA, f = 920 MHz, Pulse CW Signal Measurements. (Pulse Width=100 μs, Duty cycle=10%)					
Power Gain	G_p		20.1		dB
Drain Efficiency@P3dB	η_D		59.8		%
1 dB Compression Point	P_{-1dB}		53.3		dBm
3dB Compression Point	P_{-3dB}		54.4		dBm
Input Return Loss	IRL		-7		dB

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 28 Vdc, I_{DQ} = 1000 mA, f = 920 MHz

VSWR 10:1 at 200W pulse CW Output Power	No Device Degradation

Reference Circuit of Test Fixture Assembly Diagram

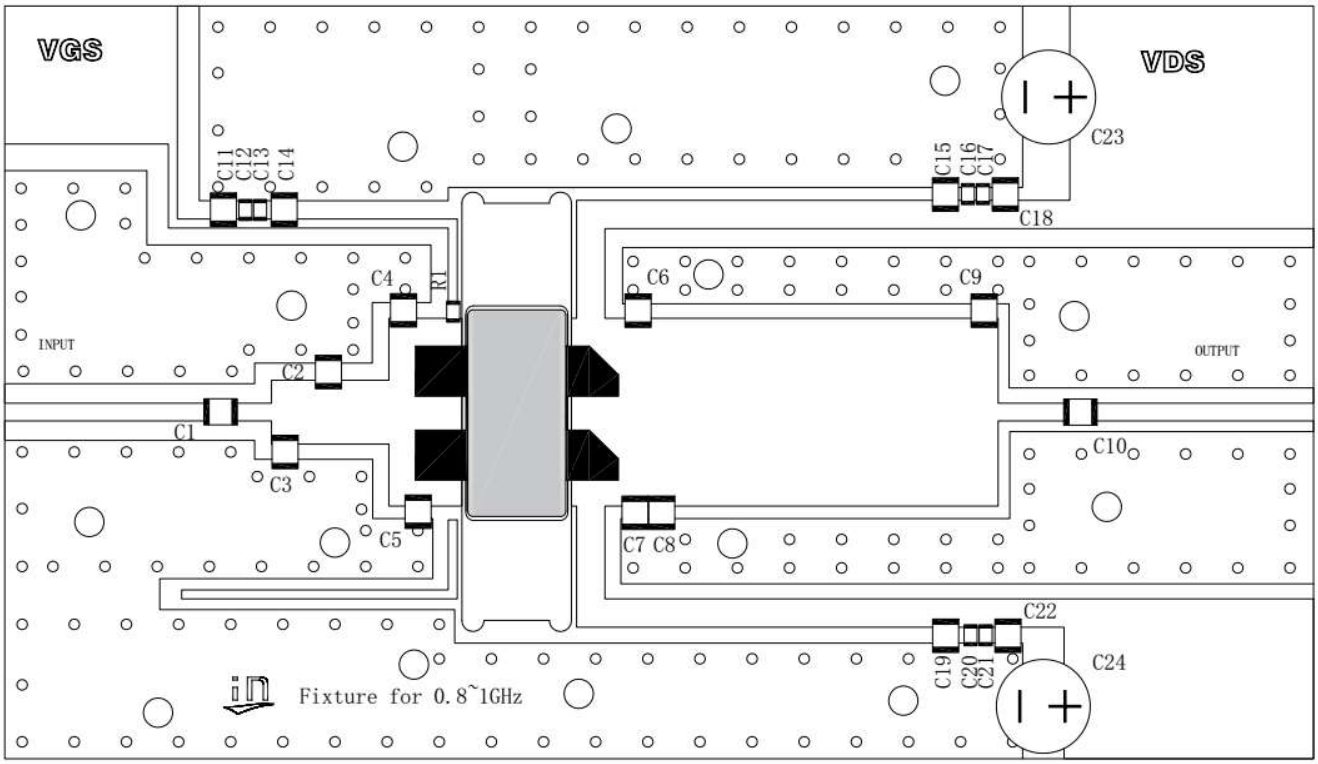


Figure 1. ITCH09200B2-R1 Test Circuit Component Layout(870MHz~880MHz)

Table 5. ITBH09200B Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer	P/N
C1,C10,C14,C15,C19	Ceramic Capacitor,47pF	ATC	800B2-R170
C2,C4,C5,C6	Ceramic Capacitor,9.1pF	ATC	800B 9R1
C3	Ceramic Capacitor,1.8pF	ATC	800B 1R8
C7,C8	Ceramic Capacitor,3.9pF	ATC	800B 3R9
C9	Ceramic Capacitor,2.7pF	ATC	800B 2R7
C13,C16,C20	Capacitor,1000pF	Murata	GRM21BR71H102
C12,C17,C21	Capacitor,0.1uF	Murata	GRM21BR71H104
C11,C18,C22	Capacitor,10uF	Murata	GRM32DF51H106
C23,C24	Electrolytic Capacitor ,470uF,63V	Vishay	MAL203858471E3
R1	Chip Resistor,10 Ω	Digi-Key	P10ECT-ND
PCB	0.76mm [0.030''] thick, εr=3.48, Rogers RO4350, 1 oz. copper		

TYPICAL CHARACTERISTICS

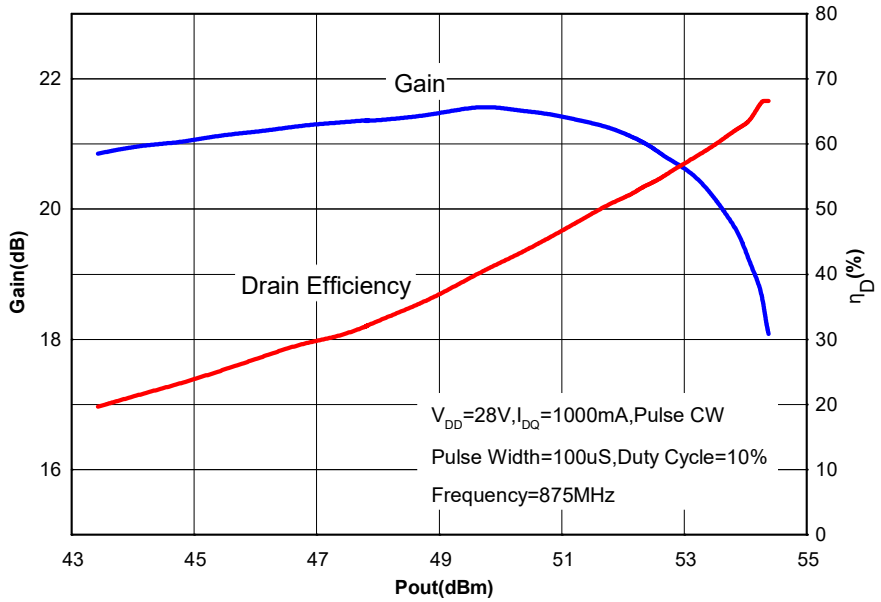


Figure 2. Power gain and drain efficiency as function of average load power

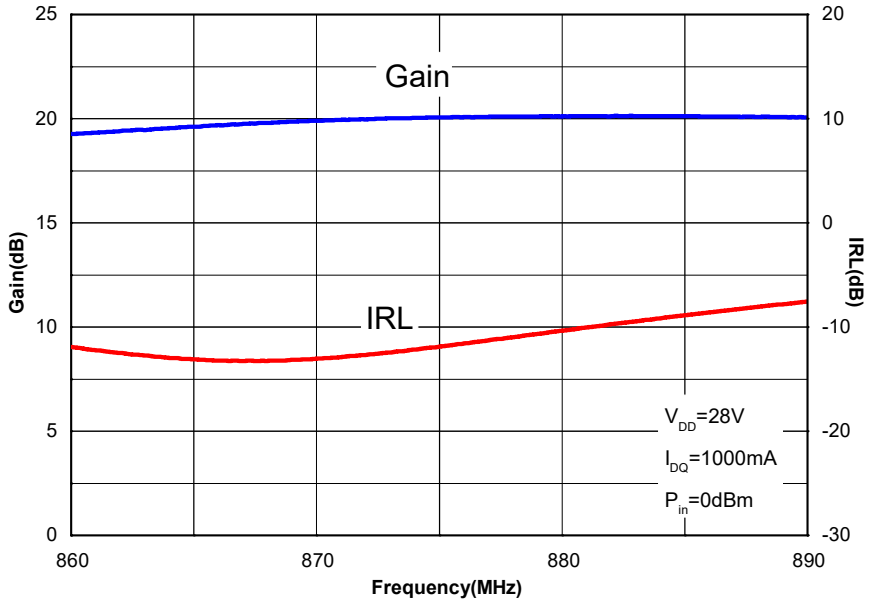
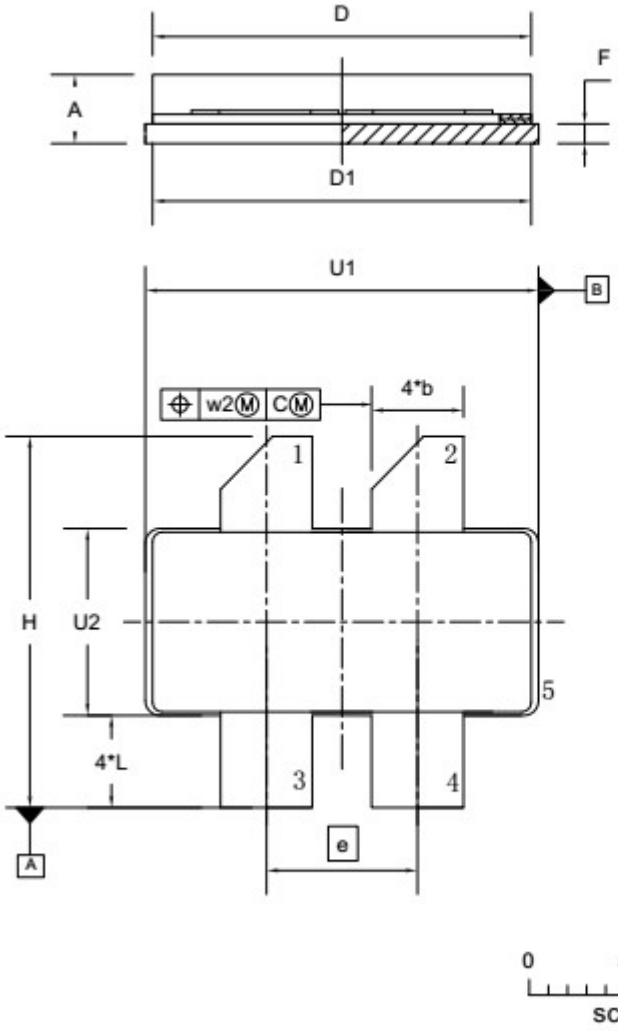


Figure 3. Broadband Frequency Response

Package Outline

Earless Flanged Ceramic Package; 4 leads



Drain		Gate		Source
1	2	3	4	5

UNIT	A	b	c	D	D_1	e	E	F	H	L	Q	U_1	U_2	W_1	W_2
mm	4.72 3.43	4.93 4.67	0.15 0.08	20.02 19.61	19.96 19.66	7.90	9.50 9.30	1.14 0.89	19.94 18.92	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	0.045 0.035	0.785 0.745	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-B2-R1					03/12/2013

Revision history

Table 6. Document revision history

Date	Revision	Datasheet Status
2017/12/01	**Rev 1.0**	**Product Datasheet**
2022/4/2	**Rev 1.1**	From ITBH09200B2, changed package to B4 from B2

Disclaimers