



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

### Description

The ITBH09200B 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.

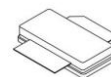
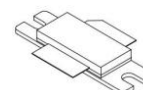
- Typical Single-Carrier W-CDMA Performance:  $V_{DD}=28\text{Volts}$ ,  $I_{DQ}=1000\text{ mA}$ ,  $P_{out}=40\text{ Watts Avg.}$ , IQ Magnitude Clipping, Channel Bandwidth = 3.84 MHz, Input Signal PAR = 7.5 dB @ 0.01% Probability on CCDF.

Frequency	Gp (dB)	$\eta_D$ (%)	ACPR <sub>5M</sub> (dBc)	ACPR <sub>10M</sub> (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 Innegration fixture with device soldered):

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

Frequency	Gp (dB)	P <sub>-1dB</sub> (dBm)	$\eta_D@P_{-1}$ (%)	P <sub>-3dB</sub> (dBm)	$\eta_D@P_{-3}$ (%)
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

**ITBH09200B2****ITBH09200B2E**

### 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	$V_{DSS}$	75	Vdc
Gate--Source Voltage	$V_{GS}$	-10 to +10	Vdc
Operating Voltage	$V_{DD}$	+32	Vdc
Storage Temperature Range	$T_{stg}$	-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 $T_C=85^\circ\text{C}$ , $T_J=200^\circ\text{C}$ , DC test	$R_{\theta JC}$	0.35	°C/W

**Table 3. ESD Protection Characteristics**

Test Methodology	Class
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Human Body Model (per JESD22--A114)	Class 2
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**Table 4. Electrical Characteristics** (TA = 25 °C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**DC Characteristics**

Drain-Source Breakdown Voltage (V <sub>GS</sub> =0V; I <sub>D</sub> =100uA)	V <sub>DSS</sub>	75			V
Zero Gate Voltage Drain Leakage Current (V <sub>DS</sub> = 28 V, V <sub>GS</sub> = 0 V)	I <sub>DSS</sub>			1	μA
Gate--Source Leakage Current (V <sub>GS</sub> = 6 V, V <sub>DS</sub> = 0 V)	I <sub>GSS</sub>			1	μA
Gate Threshold Voltage (V <sub>DS</sub> = 28V, I <sub>D</sub> = 1 mA)	V <sub>GS(th)</sub>		2.2		V
Gate Quiescent Voltage (V <sub>DD</sub> = 28 V, I <sub>DQ</sub> = 1000 mA, Measured in Functional Test)	V <sub>GS(Q)</sub>	2.6	3.1	3.6	V

**Functional Tests (In Innegration Test Fixture, 50 ohm system)** :V<sub>DD</sub> = 28 Vdc, I<sub>DQ</sub> = 1000 mA, f = 920 MHz, Pulse CW Signal Measurements.  
(Pulse Width=100 μs, Duty cycle=10%)

Power Gain	G <sub>p</sub>		20.1		dB
Drain Efficiency@P3dB	η <sub>D</sub>		59.8		%
1 dB Compression Point	P <sub>-1dB</sub>		53.3		dBm
3dB Compression Point	P <sub>-3dB</sub>		54.4		dBm
Input Return Loss	IRL		-7		dB

**Load Mismatch (In Innegration Test Fixture, 50 ohm system):** V<sub>DD</sub> = 28 Vdc, I<sub>DQ</sub> = 1000 mA, f = 920 MHz

VSWR 10:1 at 200W pulse CW Output Power	No Device Degradation
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## Reference Circuit of Test Fixture Assembly Diagram

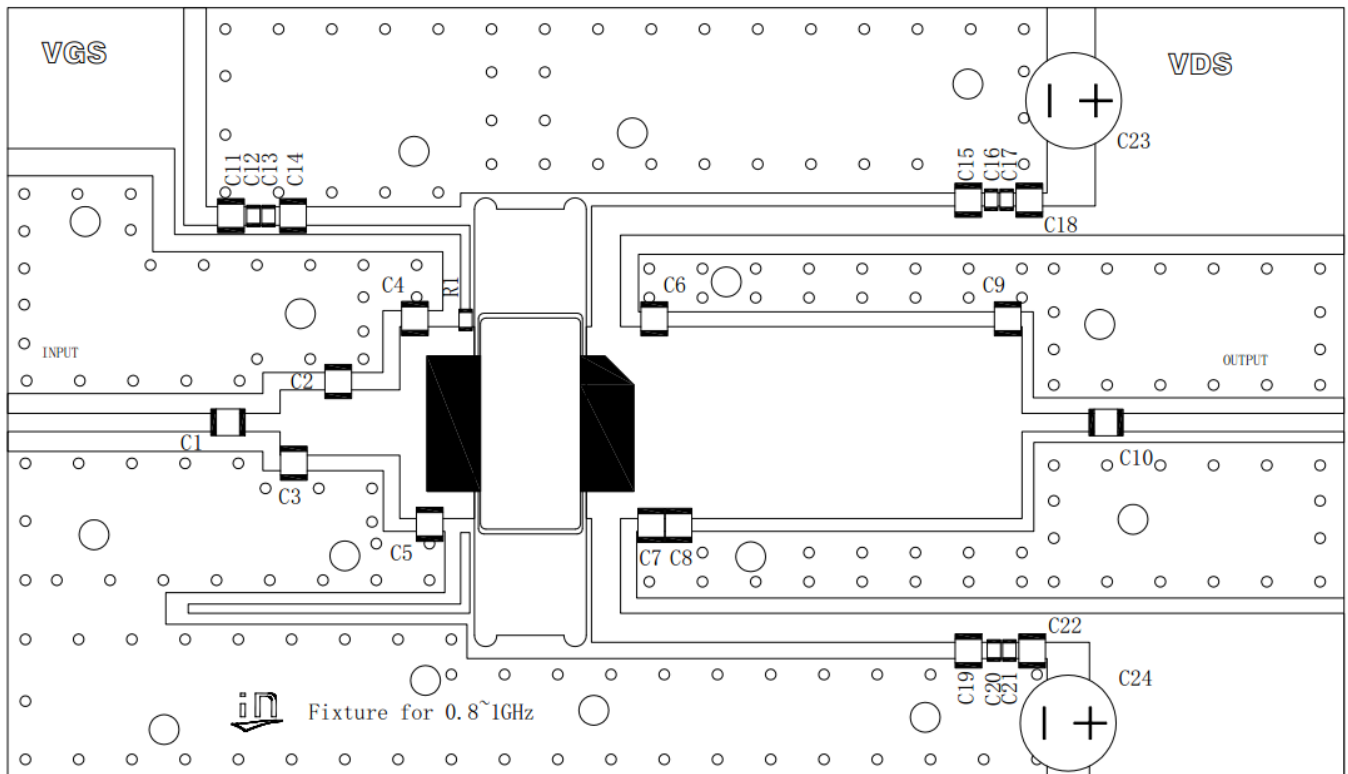


Figure 1. ITBH09200B Test Circuit Component Layout(870MHz~880MHz)

Table 5. ITBH09200B Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer	P/N
C1,C10,C14,C15,C19	Ceramic Capacitor,47pF	ATC	800B470
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,10Ω	Digi-Key	P10ECT-ND
PCB	0.76mm [0.030"] thick, ε <sub>r</sub> =3.48, Rogers RO4350, 1 oz. copper		

## TYPICAL CHARACTERISTICS

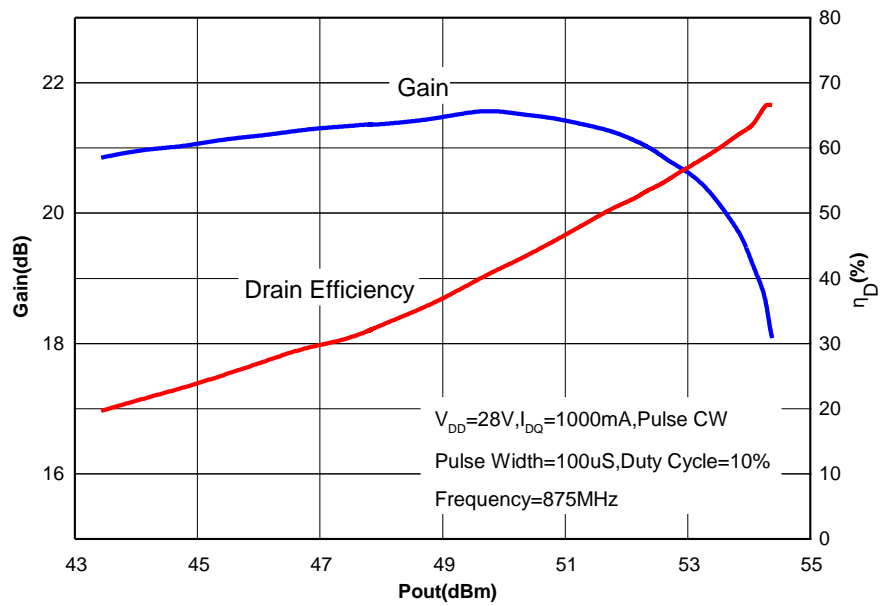


Figure 2. Power gain and drain efficiency as function of average load power

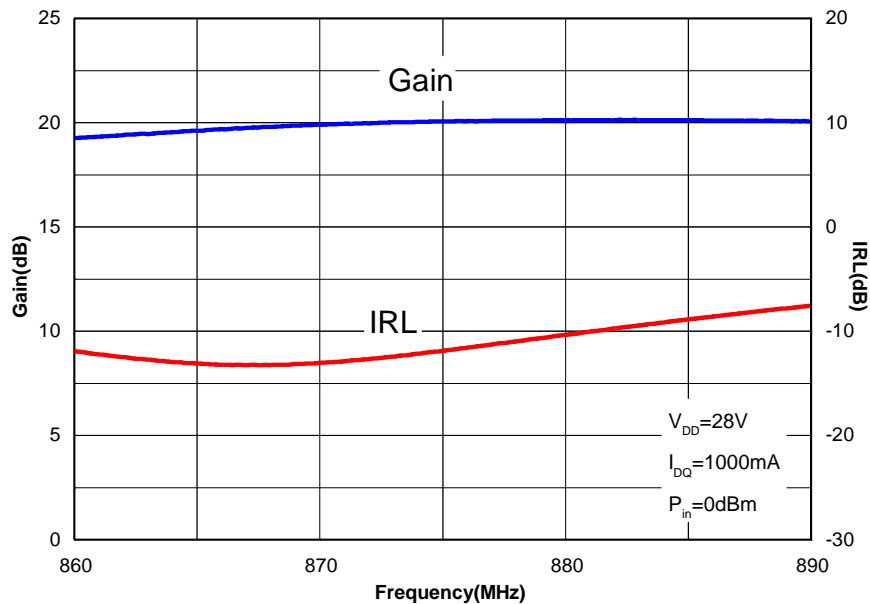
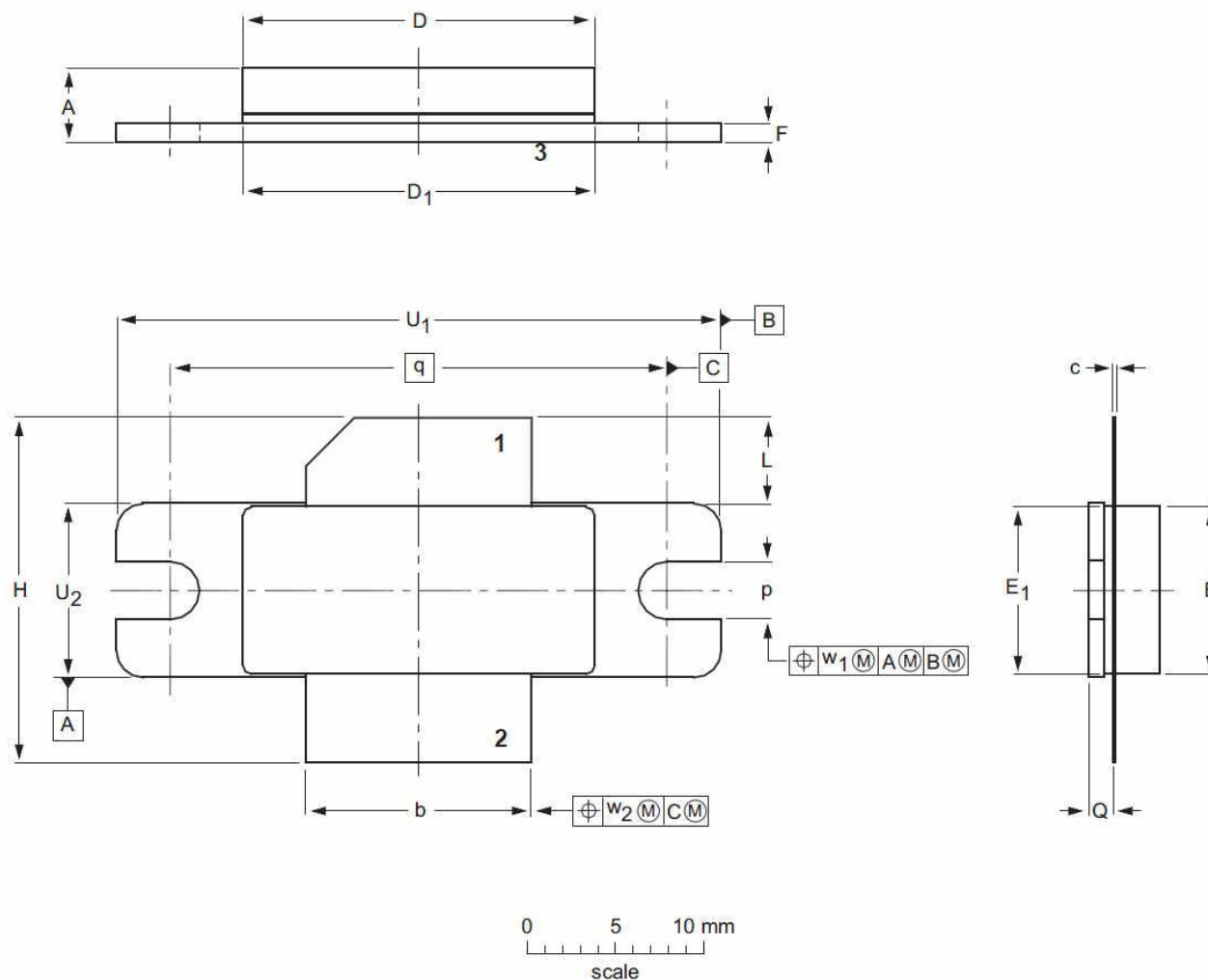


Figure 3. Broadband Frequency Response



## Package Outline

Flanged ceramic package; 2 mounting holes; 2 leads (1—DRAIN、2—GATE、3—SOURCE)

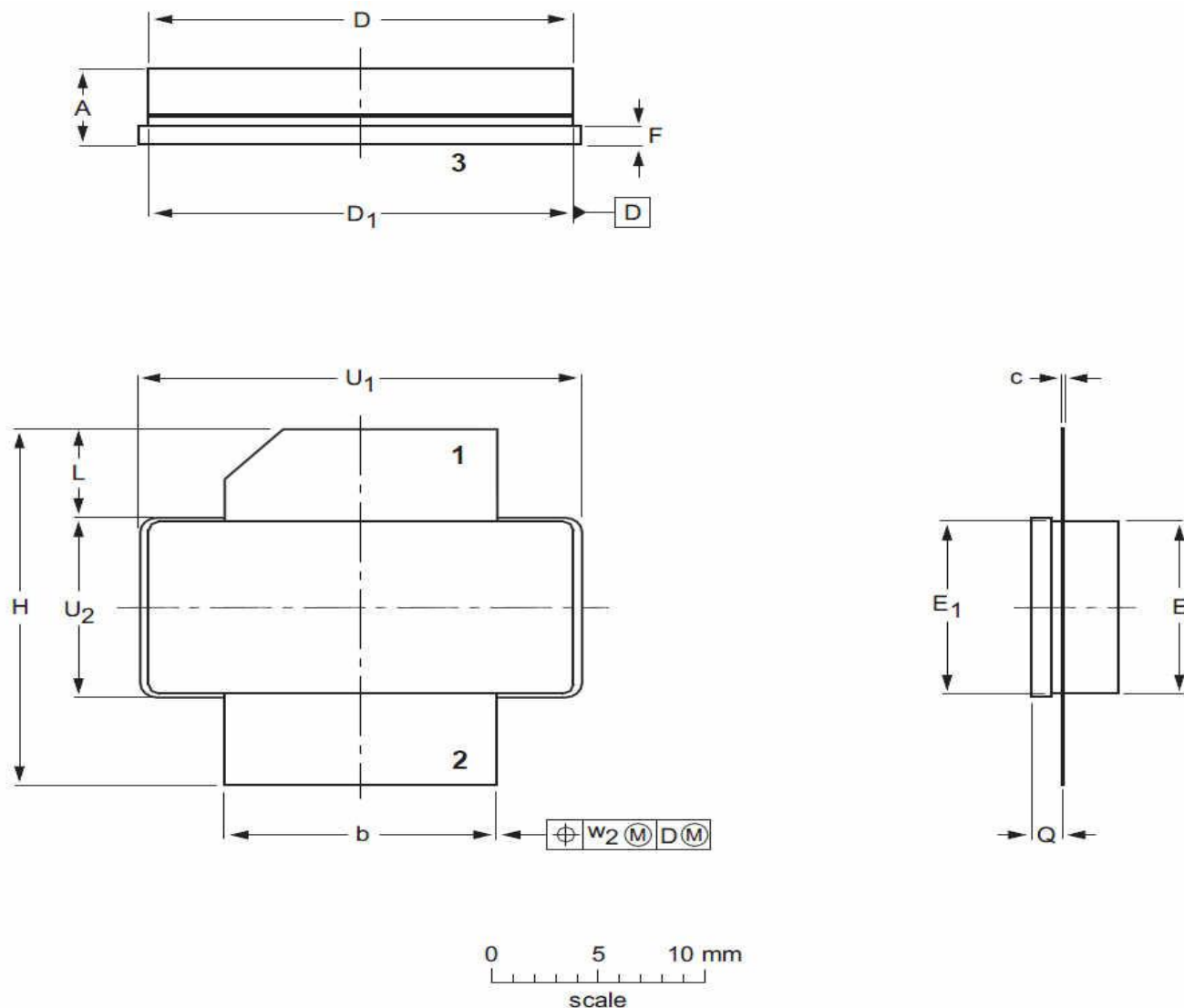


UNIT	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>
mm	4.72	12.83	0.15	20.02	19.96	9.50	9.53	1.14	19.94	5.33	3.38	1.70	27.94	34.16	9.91	0.25	0.51
	3.43	12.57	0.08	19.61	19.66	9.30	9.25	0.89	18.92	4.32	3.12	1.45		33.91	9.65		
inches	0.186	0.505	0.006	0.788	0.786	0.374	0.375	0.045	0.785	0.210	0.133	0.067	1.100	1.345	0.390	0.01	0.02
	0.135	0.495	0.003	0.772	0.774	0.366	0.364	0.035	0.745	0.170	0.123	0.057		1.335	0.380		

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B2E					03/12/2013



Earless flanged ceramic package; 2 leads (1—DRAIN、2—GATE、3—SOURCE)



UNIT	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	L	Q	U <sub>1</sub>	U <sub>2</sub>	W <sub>2</sub>
mm	4.72	12.83	0.15	20.02	19.96	9.50	9.53	1.14	19.94	5.33	1.70	20.70	9.91	0.25
	3.43	12.57	0.08	19.61	19.66	9.30	9.25	0.89	18.92	4.32	1.45	20.45	9.65	
inches	0.186	0.505	0.006	0.788	0.786	0.374	0.375	0.045	0.785	0.210	0.067	0.815	0.390	0.010
	0.135	0.495	0.003	0.772	0.774	0.366	0.364	0.035	0.745	0.170	0.057	0.805	0.380	

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B2					03/12/2013



## Revision history

Table 6. Document revision history

Date	Revision	Datasheet Status
2014/07/11	Rev 1.0	Preliminary Datasheet
2015/03/11	Rev 2.0	Product Datasheet

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