



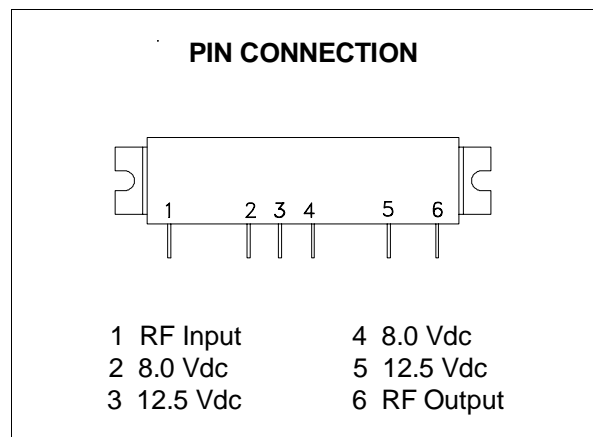
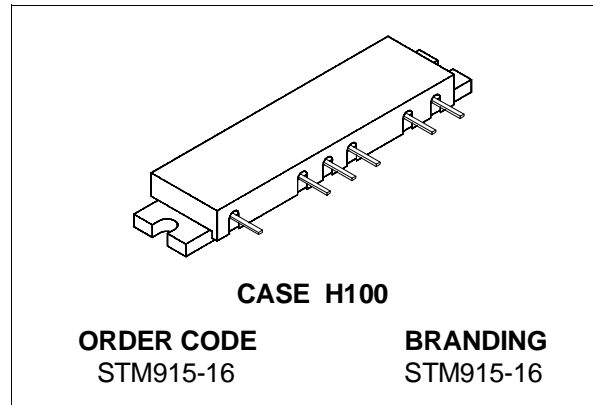
# STM915-16

## RF POWER MODULE GSM MOBILE APPLICATIONS

- LINEAR POWER AMPLIFIER
- 890-915 MHz
- 12.5 VOLTS
- INPUT/OUTPUT 50 OHMS
- P<sub>OUT</sub> = 16 W MIN.
- GAIN = 42 dB MIN.

### DESCRIPTION

The STM915-16 is a linear power module designed for 12.5 V applications in GSM Cellular Radio Systems. The STM915-16 uses gold metallized transistors with diffused emitter ballast resistors for high linearity Class AB operation.



### ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25 °C)

Symbol	Parameter	Value	Unit
V <sub>S2</sub> , V <sub>S4</sub>	DC Supply Voltage (RF applied/No RF applied)	15.6/30.0	Vdc
V <sub>S1</sub> , V <sub>S3</sub>	DC Supply Voltage	8.5	Vdc
V <sub>CONTROL</sub>	DC Control Voltage	4.5	Vdc
P <sub>IN</sub>	RF Input Power (P <sub>OUT</sub> ≤ 17 W)	3.0	mW
P <sub>OUT</sub> <sup>1</sup>	RF Output Power (V <sub>S2</sub> , V <sub>S4</sub> = 12.5 V)	20	W
T <sub>STG</sub>	Storage Temperature	- 30 to + 100	°C
T <sub>C</sub>	Operating Case Temperature	- 30 to + 100	°C

Note1: Pulse Width = 577 μsec.  
Repetition rate = 4.6 msec.

**ELECTRICAL SPECIFICATIONS** ( $T_{case} = 25^{\circ}C$ ,  $V_{S1}, V_{S3} = 8.0$  Vdc;  $V_{S2}, V_{S4} = 12.5$  Vdc)

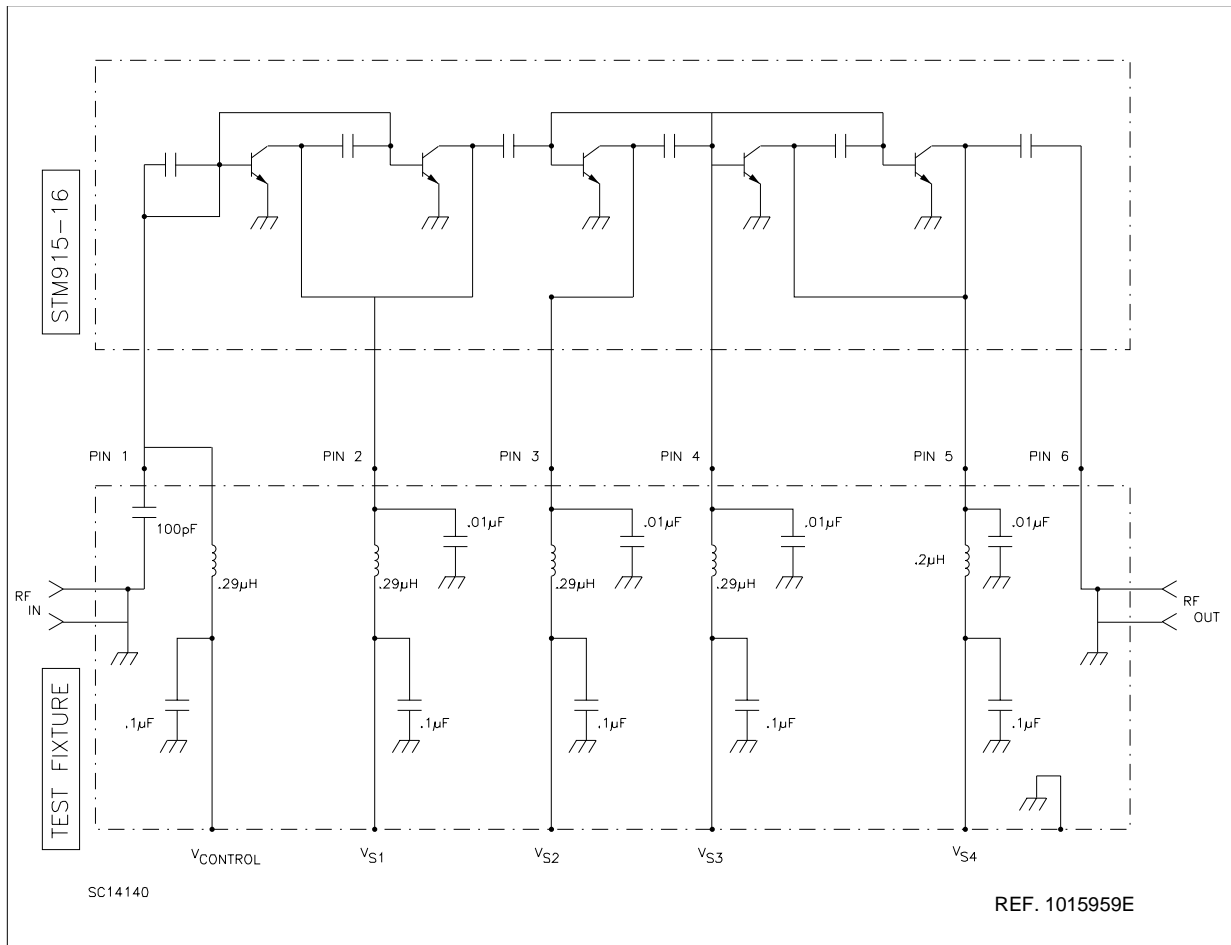
Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
BW	Frequency Range		890		915	MHz
P <sub>OUT</sub>	Output Power <sup>1,2</sup>	V <sub>CONT</sub> = 4.0 Vdc P <sub>IN</sub> = 1 mW	16			W
η	Efficiency <sup>1, 2</sup>	P <sub>OUT</sub> = 16 W	35	41		%
I <sub>Q1</sub>	Leakage Current, V <sub>S1</sub> , V <sub>S2</sub>	V <sub>CONT</sub> = 0 Vdc P <sub>IN</sub> = 1 mW		0.5	2.0	mA
I <sub>Q2</sub>	Bias Current, V <sub>S3</sub>	V <sub>CONT</sub> = 0 Vdc P <sub>IN</sub> = 1 mW		140	150	mA
I <sub>Q3</sub>	Quiescent Current, V <sub>S4</sub>	V <sub>CONT</sub> = 0 Vdc P <sub>IN</sub> = 1 mW		200	250	mA
	Control Dynamic Range <sup>3</sup>	V <sub>CONT</sub> = 0 to 4.0V	56			dB
	Isolation	V <sub>CONT</sub> = 0 Vdc V <sub>S2, S4</sub> = 0 to 15.6V			-14	dBm
H	Harmonics <sup>1, 2</sup>	P <sub>OUT</sub> = 42 dBm reference			-45	dBc
VSWR <sub>IN</sub>	Input VSWR <sup>1,2</sup>	P <sub>OUT</sub> = +13 dBm to +42 dBm			2.0:1	
V <sub>CONT</sub>	Control Voltage		0		4.0	Vdc
I <sub>CONT</sub>	Control Current			1.0	2.0	mA
T <sub>r</sub>	Rise Time <sup>1, 2, 4</sup>	P <sub>OUT</sub> = +13 to +42 dBm			1.0	μSec
	Noise Power	30 KHz Bandwidth, 20 MHz above f <sub>0</sub> P <sub>OUT</sub> = +13 dBm to +42 dBm CW		-70	-65	dBm
	Stability <sup>1, 2</sup>	P <sub>OUT</sub> = - 14 to +42 dBm V <sub>S2</sub> , V <sub>S4</sub> = 10.8 to 15.6 V Load VSWR = 6:1 Source VSWR = 3:1 All phase angles T <sub>C</sub> = - 20 to +60°C	All Spurious outputs more than 60dB below carrier			
	Load Mismatch <sup>1,2</sup>	VSWR = 10:1 All phase angles V = 15.6Vdc P <sub>OUT</sub> = 16 W	No Degradation in Output Power			

Notes: 1) P<sub>IN</sub> = 1.0mW adjust V<sub>CONTROL</sub> for specified P<sub>OUT</sub>. 3) P<sub>OUT</sub> (Reference) = 42 dBm REF. 1014655E  
 2) Pulse Width = 577 μsec. 4) T<sub>r</sub> measured at 1% to 81% of P<sub>OUT</sub> in watts  
 Repetition rate = 4.6 msec.

**GSM SPECIFIC TESTS**

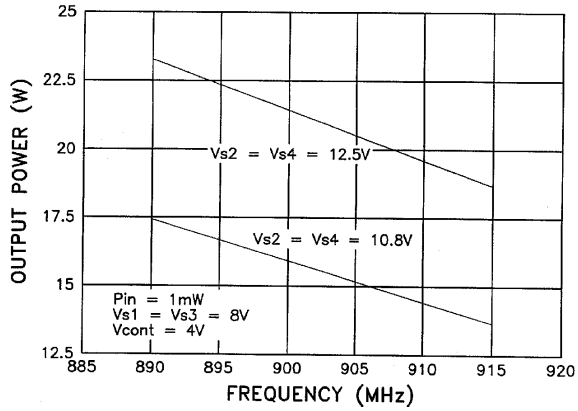
Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
	AM/AM Conversion Gain	P <sub>IN</sub> = f <sub>0</sub> (0 dBm)+[f <sub>0</sub> + 200 kHz (- 40 dBm)]  V <sub>CONTROL</sub> adjusted for P <sub>OUT</sub> = 13, 30, 42 dBm  P <sub>OUT</sub> (f <sub>0</sub> + 200 kHz) P <sub>OUT</sub> (f <sub>0</sub> - 200 kHz)		- 40 - 45		dBc dBc
	AM/PM Conversion	P <sub>OUT</sub> = +13 to + 42 dBm P <sub>IN</sub> varied +/- .5 dB		4		°/dB

MODULE DC AND TEST FIXTURE CONFIGURATION

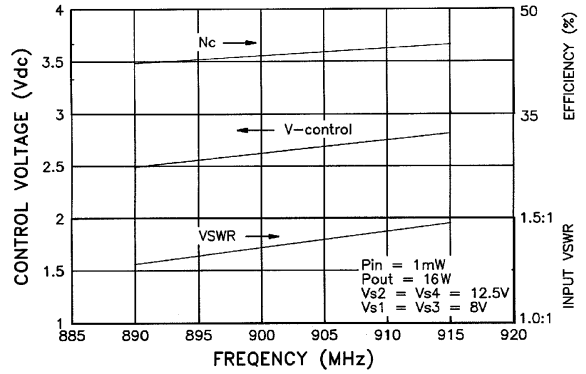


TYPICAL PERFORMANCE

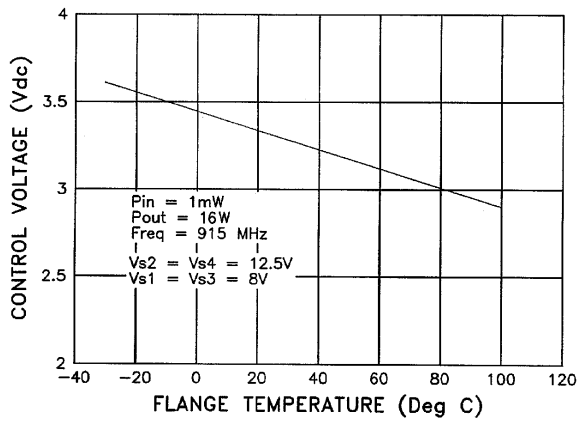
Output Power vs Frequency



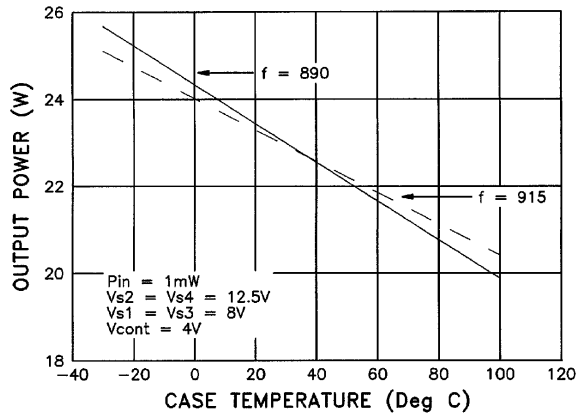
Control Voltage, Efficiency & Input VSWR vs Frequency



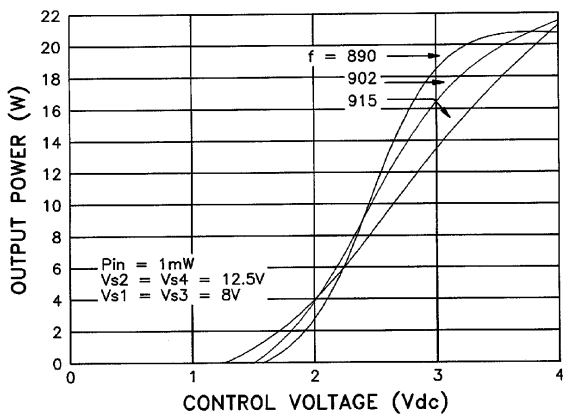
Control Voltage vs Case Temperature



Output Power vs Case Temperature



Output Power vs Control Voltage



## APPLICATIONS RECOMMENDATIONS

### OPERATION LIMITS

The STM915-16 power module should never be operated under any condition which exceeds the Absolute Maximum Ratings presented on this data sheet. Nor should the module be operated continuously at any of the specified maximum ratings. If the module is to be operated under any condition such that it may be subjected to one or more of the maximum rating conditions, care must be taken to monitor other parameters which may be affected. For example, a combination of high  $V_{S3}$  and input overdrive could result in exceeding the maximum output power rating; in this condition, the output power must be maintained below the maximum rating by use of the gain control pin.

### GAIN CONTROL

The module output power should be limited to 20 watts (43 dBm). The module is designed to be operated with  $V_{S1}$  and  $V_{S3}$  set to 8.0 Vdc,  $V_{S2}$  and  $V_{S4}$  set to 12.5 Vdc and input power set to 1.0 mW (0 dBm). Module gain is adjusted by varying  $V_{CONTROL}$ .

### DECOUPLING

The bypassing internal to the module is sufficient for the frequency range 90-1300 MHz. Care should be taken to insure proper decoupling for each application as the module is capable of a wide range of operating characteristics including "linear" operation, in which an important design criteria is the use of appropriate bypassing. For bypassing low frequencies while maintaining the electrical specifications contained in this data sheet, use of the decoupling network shown in the "Module DC and Test Fixture Configuration" diagram herein is recommended.

### MODULE MOUNTING

To insure adequate thermal transfer from the module to the heatsink, it is recommended that a satisfactory thermal compound such as Dow Corning 340, Wakefield 120-2 or equivalent be applied between the module flange and the heatsink.

The heatsink mounting surface under the module should be flat to within  $\pm 0.05$  mm ( $\pm 0.002$  inch). The module should be mounted to the heatsink using 3 mm (or 4-40) or equivalent screws torqued to 5-6 kg-cm (4-6 in-lb).

The module leads are attached to the equipment PC board using 180°C solder applied to the leads with it properly grounded soldering iron tip, not to exceed 195°C, applied a minimum of 2 mm (0.080 inch) from the body of the module for a duration not to exceed 15 seconds per lead. It is imperative that no other portion of the module, other than the leads, be subjected to temperatures in excess of 100°C (maximum storage temperature), for any period of time, as the plastic moulded cover, internal components and sealing adhesives may be adversely affected by such conditions.

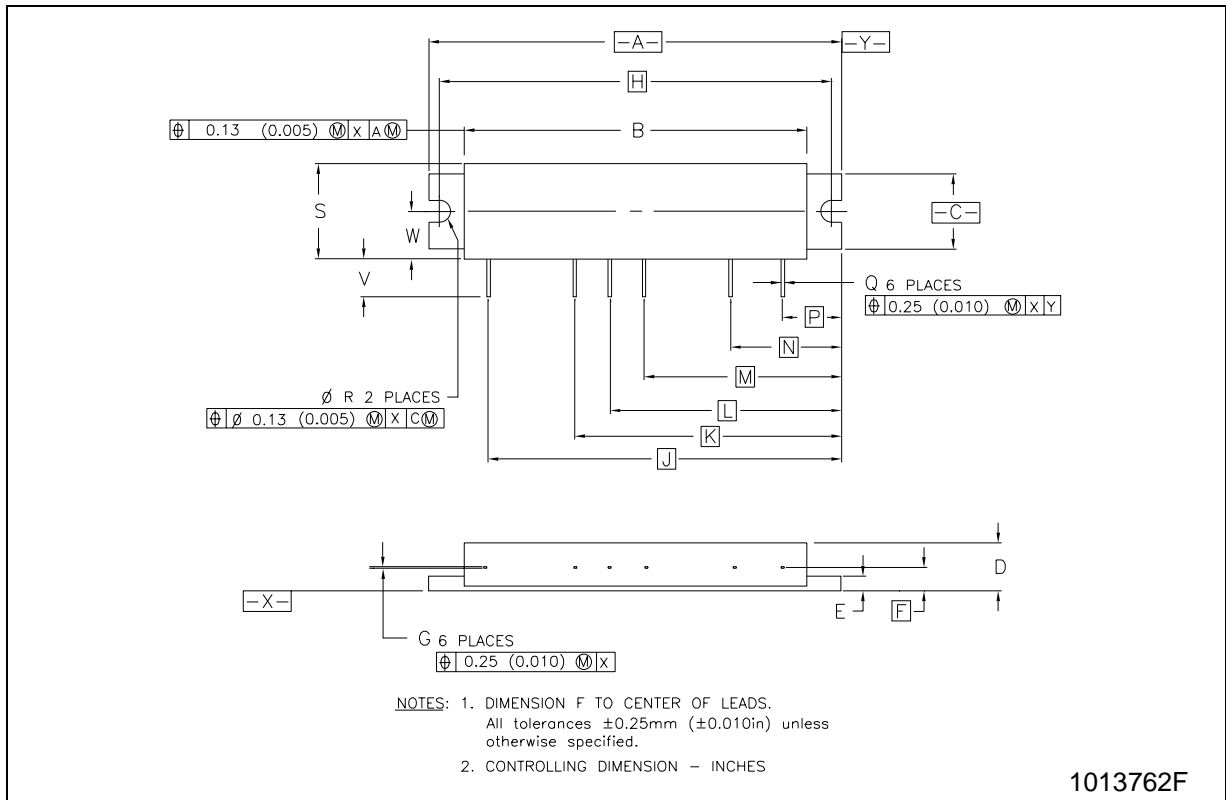
Due to the construction techniques and the materials used within the module, reflow soldering of the flange heatsink or leads, is not recommended.

### THERMAL CONSIDERATIONS

It will be necessary to provide a suitable heatsink in order to maintain the module flange temperature at or below the maximum case operating temperature. In a case where the module output power will be limited to +42 dBm (16 W) and designing for the worst case efficiency of 35%, the power dissipated by the module will be 29.7 watts. The heatsink must be designed such that the thermal rise will be less than the difference between the maximum ambient temperature at which the module will operate and the maximum operating case temperature of the module while dissipating 29.7 watts.

## H100 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	60.45		60.83	2.380		2.395
B	50.04		50.54	1.970		1.990
C	11.31		11.81	0.445		0.465
D	6.35		6.73	0.250		0.265
E	2.16		2.54	0.085		0.100
F		3.35			0.132	
G	0.13		0.38	0.005		0.015
H		57.40			2.260	
J		51.87			2.042	
K		39.17			1.542	
L		34.09			1.342	
M		29.01			1.142	
N		16.31			0.642	
P		8.69			0.342	
Q	0.38		0.64	0.015		0.025
R	3.05		3.30	0.120		0.130
S	13.59		14.09	0.535		0.555
V	4.49		5.51	0.177		0.217
W	6.78		7.06	0.267		0.278



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