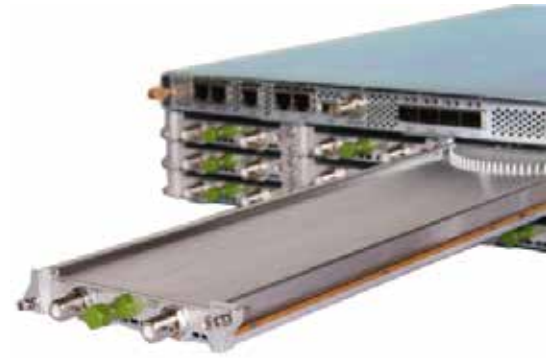


NSG™ 36R1G

384-MHZ QAM RF MODULE



The NSG 36R1G is a high-density QAM RF module used in Harmonic’s NSG™ 9000 universal EdgeQAM platform. The module has two RF ports, each capable of outputting up to 36 QAMs (ITU-T J.83 Annex B/C) or up to 27 QAMs (ITU-T J.83 Annex A).

The configuration of the RF output ports is highly flexible, allowing the number of QAMs and the QAMs frequency location for each port to be set across non-contiguous frequency blocks.

The 36R1G can be used for multiple applications, including video on demand (VOD), switched digital video (SDV), linear broadcast, DOCSIS-compliant modular CMTS (M-CMTS) and Cable IPTV Direct-2- Edge. As part of the NSG 9000 platform, the 36R1G module can be easily and effectively managed and configured using a stand-alone web GUI, the Mass Configuration Tool (MCT), Harmonic’s NMXTM Digital Service Manager or any other SNMP-compliant management platform.

The number of output QAM channels can be set independently for each RF port, ranging from 8 QAMs per port up to 36 QAMs per port (Annex B/C) setting an unprecedented density bar for commercial EQAM products. The location of the QAM channels can be easily set to the required frequencies within a 384 MHz frequency window. The operator can adjust the RF output spectrum according to the HFC system spectrum constraints and the specific solution topology.

The QAM RF module receives video and data streams from the NSG 9000 main board, scrambles the streams when encryption is enabled, applies FEC interleaving according to the configured standard, and then modulates them directly into target QAM frequencies allowing flexible non-adjacent QAM placement out of single port.

The signal processing and RF path used in the 36R1G are based on the fifth generation of Harmonic’s proven high-performance edgeQAM technology. Designed with advanced in-house digital processing techniques and high-quality custom-made RF components, the 36R1G module achieves very high RF performance, which in most cases exceeds the challenging specifications of DOCSIS DRFI.

NSG 36R1G supports output power that exceeds DOCSIS specification by 2 to 4 dBs per QAM channel depending on configuration. The new card features a unique cable loss compensation feature that allows tilting the power of all QAMs to compensate for cable attenuation that varies by frequency. This feature is accompanied by a per-QAM power attenuator allowing to fine tune the output to reach a leveled QAM output by software configuration – a task that required physical attenuators and manual HFC combining tuning in the past.

NSG 36R1G also features output return loss greater than 14 dB within any channel from 50 MHz to 1002 MHz. The phase-noise, ACP and (un-)equalized MER exceed DOCSIS specifications, translating directly into a higher-quality transmitted signal. These high-quality characteristics ensure better field performance and robustness in challenging RF environments, as well as reduced maintenance and operational costs.

The 36R1G module is hot-swappable, minimizing operational downtime by enabling easy field maintenance and upgrades.

HIGHLIGHTS

- High density QAM RF module for the NSG 9000 platform
- Up to 36 QAMs per RF port
- Flexible placement of QAMs across the spectrum
- Advanced power features including unique cable loss compensation and per-QAM attenuation
- Compliant with ITU-T J.83 Annex A,B &C and DOCSIS 3.0 DRFI
- Superior RF performance exceeding DRFI

RF PERFORMANCE

RF Frequency Range	50 MHz to 1002 MHz
RF Frequency Step Size	1 kHz setup
Carrier's Frequency Offset	± 3 KHz
QAM Constellations over temp and time	
Annex A,C	16, 32, 64, 128, 256
Annex B	64, 256

Symbol Rate (nominal)			
Annex A	16QAM, 32QAM, 64 QAM, 128QAM, 256QAM	5 to 6.952 Msym/sec	± 5ppm/ 10years
Annex B	64QAM / 256QAM	5.056941 / 5.360537 Msym/sec	± 5ppm/ 10years
Annex C	32QAM, 64 QAM, 128QAM, 256QAM	5 to 5.313 Msym/sec	± 5ppm/ 10years

Channel Bandwidth	Standard: 6 MHz, 8MHz Non-standard: 5.65 MHz to 8 MHz
QAM Density	
Annex B/C	1-36 QAMs per port over 384MHz
Annex A	1-27 QAMs per port over 384MHz

RF Output Power per Channel			
Num of QAM	DFRI	Power per Channel Annex B	Power per Channel Annex A
1-8	49 dBmV	52 dBmV	52 dBmV
9-10	48 dBmV	51 dBmV	51 dBmV
11-12	47 dBmV	50 dBmV	50 dBmV
13-14	46 dBmV	49 dBmV	49 dBmV
15-17	45 dBmV	48 dBmV	48 dBmV
18-21	44 dBmV	47 dBmV	47 dBmV
22-26	43 dBmV	46 dBmV	46 dBmV
27	42 dBmV	45 dBmV	45 dBmV

Commanded cable loss compensation Up to 10 dB below required power level (in 0.5 dB steps) and up to -2 dB per QAM (in 0.1 dB steps)

RF OUTPUT

Power Adjustment	8-dB in 0.1-dB steps
Range Amplitude Response	< 0.25 dB (per QAM)
Unequalized MER	
Annex B	> 37 dB (typical 39 dB)
Annex A	> 35 dB
Equalized MER	
Annex B	> 45 dB
Annex A	> 43 dB

Phase Noise (double sided)

1KHz - 10KHz	< -35 dBc (typical <- 40 dBc)
10KHz - 50KHz	< -54 dBc (typical <- 57 dBc)
50KHz - 3MHz	< -57 dBc (typical <- 60 dBc)
	User-friendly

Output Return Loss	14-dB within any channel from 50 MHz to 1002 MHz (typical > 16-dB)
Port to Port Isolation BER 1 x 10 ⁻¹⁰	80-dB (all Annexes)
Group Delay	< 10 ns peak to peak

COMPLIANCE (TESTED WITHIN THE NSG 9000 PLATFORM)

Electromagnetic Interference	FCC Part 15 subpart B, Class A EN 55022/ CISPR 22 Class A EN 61000-3-2:1995 + A1:1997 + A2:1998 EN 61000-3-3:1995 Immunity: EN50082-1:1997
Safety	Low Voltage directive 73/23/EEC, 50083-1 standard EN/IEC60529 UL 60950-1:2003 CAN.CSA-C22.2 No. 60950-1-03
CE	89/336/EEC, Article 7(1), 73/23/EEC, Article 5., FCC 47 CFR part 15, subpart B., ICES-003:1997 Council Directives
ESD	EN 61000-4-2; EN 55024, Section 4.2.1

ENVIRONMENTAL

Storage Temperature Range	-4°F to 176°F (-20°C to +80°C)
Operating Temperature Range	32°F to 122°F (0°C to +50°C)
Relative Humidity	0 to 95% non-condensing

PHYSICAL

Dimensions (WxHxD)	4.52" x 0.74" x 18.7" 11.5cm x 1.88cm x 47.5cm
Weight	2.31 lbs 1.050 kg
Typical Power Consumption	51 Watt
Output Connectors	2 x ANSI/SCTE 02 2006 Type-F RF connectors, 75Ω output impedance

