HOPERF®

RF Module Selection Guide - June 2018

AMATEK DESIGN

LoRa™ 433MHz & 915MHz 'Extended Range' Transceiver Modules

Low-cost, longer distance, single chip modules with selectable LoRa or FSK/GFSK/OOK modulation.

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
RFM95W - 915	LoRa/FSK/ GFSK/OOK	915	37.7 (LoRa) 300 (GFSK)	5~8	20	-139	12 / 120	0.2uA	1.8~3.7	-55~115	SPI	16x16x1.8
RFM95PW - 915 *		915		**10+**	27	-139	13 / 120	0.2uA	1.8~3.7	-55~115	SPI	35.4x18x3.9
RFM96W - 433 **		433		5~8	20	-139	12 /120	0.2uA	1.8~3.7	-55~115	SPI	16x16x1.8
RFM98W - 433 **		433		**5~8**	20	-139	10.3 /120	0.2uA	1.8~3.7	-55~115	SPI	16x16x1.8
RFM98PW - 433 *		433		**10+**	27	-136	13 / 120	0.2uA	1.8~3.7	-55~115	SPI	35.4x18x3.9

NOTES: * RFM9X-PW variants have enhanced transmit power levels for extended 'open air' transmission distances (compared to standard 'W' models).
** RFM98W is equivalent in function to the RFM96W. We can supply this part if required.

LoRa™ & LoRaWAN™ 433MHz & 915MHz Programmable RF Data Modules

Highly configurable, dual-chip modules with selectable LoRa/FSK/GFSK/OOK modulation.

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
HM-LWNHW - 915	LoRaWAN	915	9.6	5+	19.5	-129	20 / 130	2uA	3.3~5.5	-55~115	TTL/RS485 /RS232	32x21x3
HM-TRLR-D - 433	LoRa/FSK/ GFSK/OOK	433	37.7 (LoRa) 300 (GFSK)	5+	20	-139	20 / 130	2uA	3.3~5.5	-55~115	TTL	47x26
HM-TRLR-D - 915		915		5+	20	-139	20 / 130	2uA	3.3~5.5	-55~115	TTL	47x26
HM-TRLR-S - 433 *		433	37.7 (LoRa) 300 (GFSK)	5+	20	-139	16 / 130	2uA	2.4~3.6	-55~115	TTL	20x16x2
HM-TRLR-S - 915 *		915		5+	20	-139	16 / 130	2uA	2.4~3.6	-55~115	TTL	20x16x2

NOTES: * HM-TRLR-D variants include radio with a single SMA antenna connection. May require ACMA radio licence to operate.
- LoRaWAN module shipping later in 2018. Not currently available.

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433MHz & 915MHz
Transparent Data Link FSK Transceiver Modules
Low-cost transparent modules with FSK modulation.

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
HM-TRP - 433	FSK	433	115.2	1+	20	-117	na	na	na	-55~115	TTL	20x16x2
HM-TRP - 915		915	115.2	1+	20	-117	na	na	na	-55~115	TTL	20x16x2

433MHz & 915MHz
Programmable Narrow/Wide Band Transceiver Modules
With FSK/GFSK/MSK/GMSK/OOK modulation.

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
RFM69W - 433	FSK/ GFSK/ MSK/GMSK/ OOK	433	300	0.6	13	-120	16 / 45	0.1uA	1.8~3.6	-55~115	TTL	19.7x16x1.9
RFM69W - 915		915	300	0.6	13	-120	16 / 45	0.1uA	1.8~3.6	-55~115	TTL	19.7x16x1.9
RFM69HW - 433		433	300	1	**20**	-120	16 / 130	0.1uA	1.8~3.6	-55~115	TTL	19.7x16x1.9
RFM69HW - 915		915	300	1	**20**	-120	16 / 130	0.1uA	1.8~3.6	-55~115	TTL	19.7x16x1.9
RFM69CW - 433		433	300	0.6	13	-120	16 / 45	0.1uA	1.8~3.6	-55~115	TTL	16x16x1.9
RFM69CW - 915		915	300	0.6	13	-120	16 / 45	0.1uA	1.8~3.6	-55~115	TTL	16x16x1.9
RFM69HCW - 433		433	300	1	**20**	-120	16 / 130	0.1uA	1.8~3.6	-55~115	TTL	16x16x1.9
RFM69HCW - 915		915	300	1	**20**	-120	16 / 130	0.1uA	1.8~3.6	-55~115	TTL	16x16x1.9

NOTES: - RFM69**W** & RFM69**CW** are functionally the same. Only the pin-outs are different, with the RFM69**CW** compatible with older RFM12B modules.

- RFM69HW & RFM69HCW are functionally the same. Only the pin-outs are different, with the RFM69HCW compatible with older RM22B/RFM23B modules.

- '-H' variants have enhanced transmit power levels for extended 'open air' transmission distances (compared to the base models).

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433MHz & 915MHz Enhanced Transmit Power Transceiver Modules

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
RFM23BP - 433	(G)FSK/OOK	433	256	na	30	-120	25 / 550	1uA	3.3~6.0	-55~115	TTL	33x18x2
RFM23BP - 915		915	256	na	30	-120	25 / 550	1uA	3.3~6.0	-55~115	TTL	33x18x2

NOTES: - Feature 30dBm TX power output, similar to the extended distance LoRa modules. However, due to the modulation system used, these will not achieve the same open-air range as the LoRa modules, but will deliver similar data (baud) rates.

433MHz Transmitter (TX) & Receiver (RX) Modules

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
RFM110W - 433 TX	OOK	240~480	30	na	13		12.4 TX	20nA	1.8~3.6	-55~115	TWI	17.8x12.8x5
RFM210W - 433 RX		433	10	na		-108	3.8 RX	60nA	1.8~3.6	-55~115	TWI	32x11x5
RFM83C - 433 RX	ASK/OOK	433	2.5	na		-108	3 RX	0.9uA	3.6~5.5	-55~115	TWI	32x11x4.3
RFM85W - 433 RX		433	2.5	na		-110	3 RX	0.9uA	3.6~5.5	-55~115	TWI	32x11x4.3

NOTES: - These are lower power Transmit (TX) and Receive (RX) modules.
- They need to be purchased as a TX+RX 'pair'.

2.4GHz Transceiver Modules

Low-power, half duplex, uni-directional ISM band modules with GFSK modulation.

Model	Signal						Electrical			Env	Physical	
	Modulation Type	Freq (MHz)	Max Data Rate (kbps)	Max Open Air Dist (km)	Tx Pwr Max (dBm)	Rx Sensitivity (dBm)	Rx / Tx Current (mA)	Stand-By Current	Pwr Supply (V)	Operating temp (C)	Interface	Dimensions LxWxH (mm)
RFM75-S	GFSK	2400-	2000	na	20	na	na	na	1.9~3.6	-55~115	SPI	17x18x
RFM75P-S2		2400-	2000	na	20	na	na	na	1.9~3.6	-55~115	SPI	17x18x3