

QFMT5 & QFMR5

FM High Performance Transmitters & Receiver Modules

General features

- Miniature SIL package
- Fully shielded
- Optimal range up to 350 meters (1200 ft)
- Single supply voltage
- 433.92 MHz frequency
- Industry standard PIN configuration
- Three data rates up to 128 Kbps

QFMT5 Transmitters

- No adjustable components
- Good shock resistance
- Temperature compensated RF output

QFMR5 Receivers

- High sensitivity
- Analogue digital outputs
- Signal strength output (RSSI)
- On board AGC
- Single conversion FM super-het
- Double RF filtering (inc. SAW front end)
- Current consumption typically 6mA

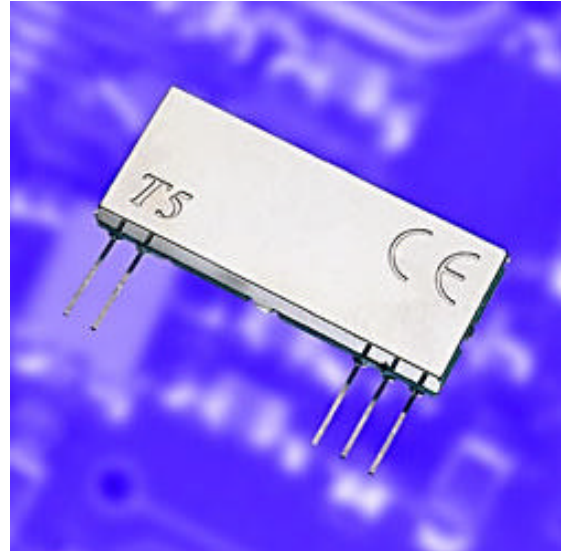
Applications

- Vehicle alarms
- Domestic and commercial wireless security systems
- Remote gate controls
- Garage door openers
- Robotics
- Remote sensing
- Process control

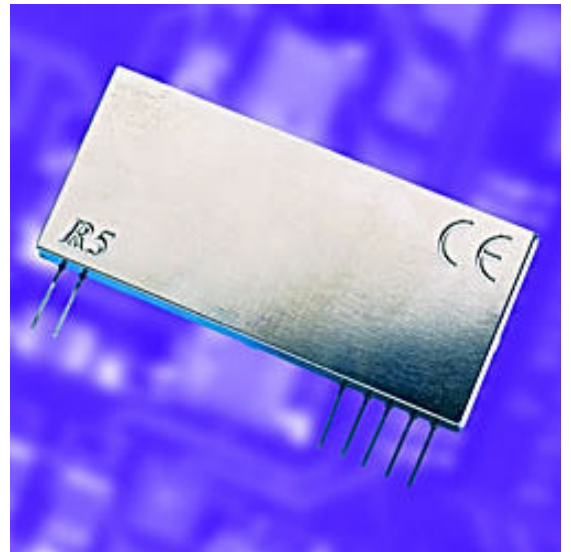
Description

The QFMT5 and QFMR5 data link modules are miniature UHF radio modules, which enable the implementation of a simple telemetry link up to 350 metres (1200 ft), and at data rates of up to 128Kbit/s

The QFMT5 and QFMR5 modules will suit one-to-one and multi-node wireless links in applications including building and car security, remote industrial process monitoring and computer networking.



QFMT5



QFMR5

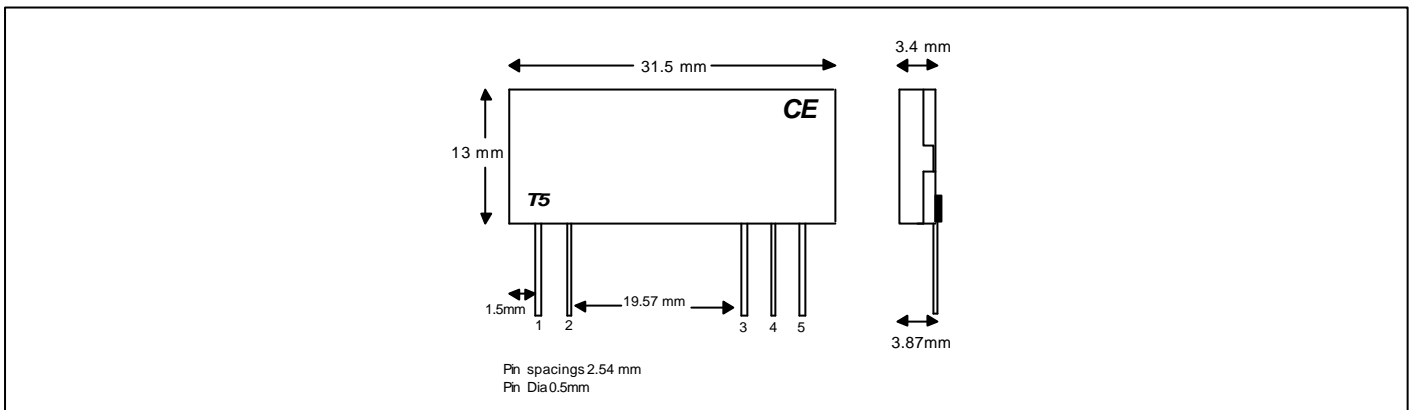
QFMT5 & QFMR5

Because of its small size and low power requirements, these modules are ideal for use in portable battery powered wireless applications.

Manufacturer

Manufactured in the UK by **Quasar Ltd.**

Connection Diagram & Dimensions – QFMT5 Transmitter



PIN Description - QFMT5 Transmitter

RF GND (pin 1)

RF ground pin, internally connected to pin 4 (0V). This pin should ideally be connected to the nearest ground plane (e.g. coax braid, main PCB ground plane etc.)

RF OUT (pin 2)

50Ω RF antenna output. To achieve best results the antenna impedance must match that of the module.

V_{CC} (pin 3)

+Ve supply pin (3.0 to 9.0 volts). The module will generate RF when V_{CC} is present. It is strongly recommended that a 100nF capacitor de-couples the supply rail as close as possible to this pin.

GND (pin 4)

Supply and data ground connection, connected to pin 1.

Data IN (pin 5)

This input has an impedance of 47KΩ and should ideally be driven by a CMOS logic drive or compatible. The drive circuitry should be supplied with the same supply voltage as the Tx module.

QFMT5 & QFMR5

Absolute Maximum Ratings – QFMT5 Transmitter

Operating temperature	-20°C to +55°C
Storage temperature	-40°C to +100°C
Supply Voltage (pin 3)	10V
Data input (pin 5)	10V
RF Out (pin 2)	±50V @ <10 MHz, +20dBm @ > 10 MHz

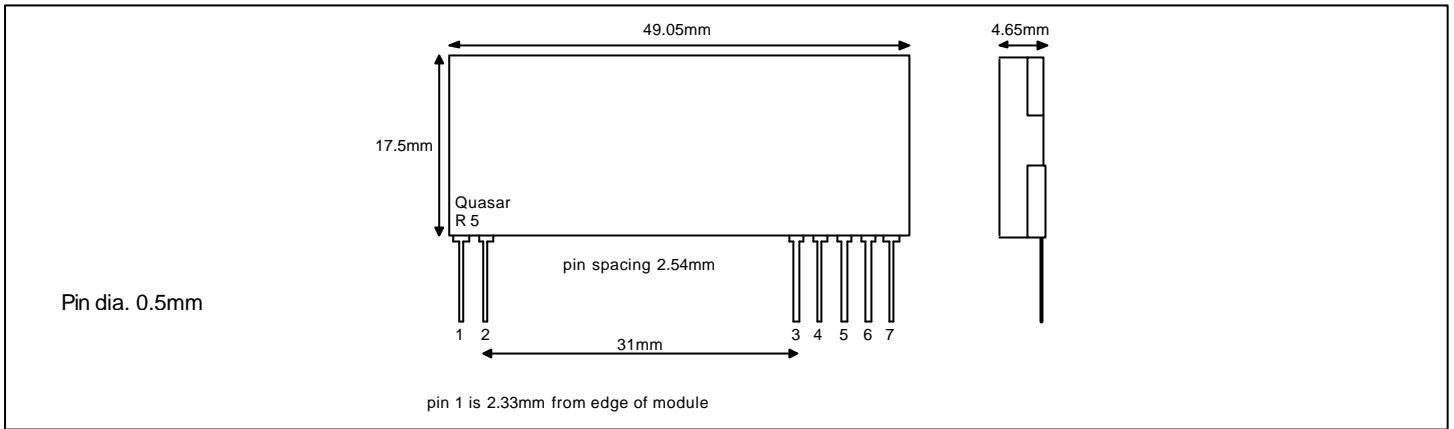
Electrical characteristics – QFMT5 Transmitter

	pin	Min.	typ.	Max.	units	notes
5v module 433.92 MHz						
Supply voltage	3	4	5.0	6	Volts	
Supply current		5.5	7	9.3	mA	
RF power		7	10	12	dBm	1
3v module 433.92 MHz						
Supply voltage	3	2	3	4	Volts	
Supply current		3	5	6.9	mA	
RF power		4	7	10	dBm	1
RF & Data						
2 nd harmonic			-50		dBc	1
Harmonics @ > 1GHz			-46		dBc	1
Initial frequency accuracy			±50		KHz	
Overall frequency accuracy			±75		KHz	
Modulation bandwidth @ -3dB			25		KHz	
Modulation distortion (THD)					%	
Power up time to full RF			10		µs	
Data rate		100		128000	bits/s	
Data pulse width		15			µs	

Note 1: measured into a 50Ω impedance

QFMT5 & QFMR5

Connection Diagram & Dimensions – QFMR5 Receiver



PIN Description QFMR5 Receiver

RF IN (pin 1)

50 RF input from antenna, connect using shortest possible route. This input is isolated from the internal circuit using the air gap of the front end SAW RF filter

RF GND (pin 2)

RF ground connection, preferable connected to a solid plane.

RSSI (pin 3)

The Received Signal Strength Indicator provides a DC output voltage proportional to the FR input signal. The amplitude of the RSSI voltage increases with increasing RF signal strength.

GND (pin 4)

Connect to power supply ground.

V_{cc} (pin 5)

+Ve supply pin. Operation from a 5V supply able to source 6mA at less than V_{p-p} ripple.

AF (pin 6)

Audio frequency output.

DATA OUT (pin 7)

CMOS compatible output. This may be used to drive external decoders.

QFMT5 & QFMR5

Absolute Maximum Ratings – QFMR5 Receiver

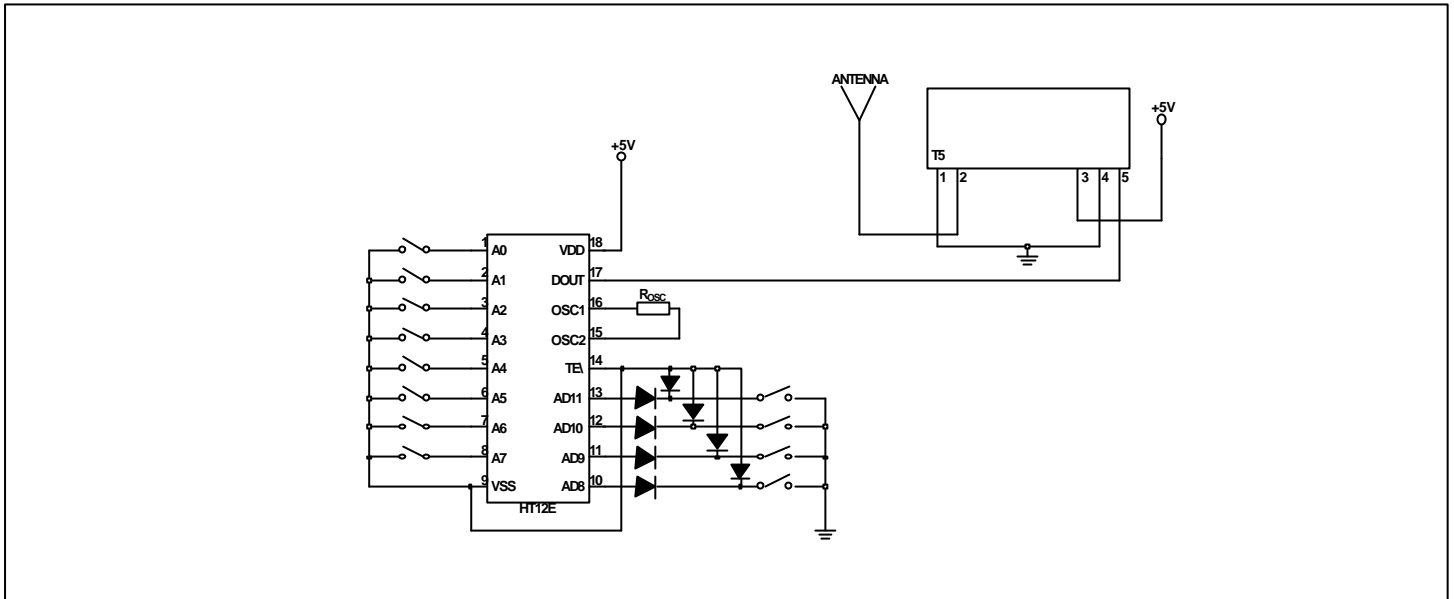
Operating temperature	-10°C to +55°C
Storage temperature	-40°C to +100°C
Data input (pin 5)	7V
RF Out (pin 1)	+20 dBm

Electrical characteristics – QFMR5 Receiver

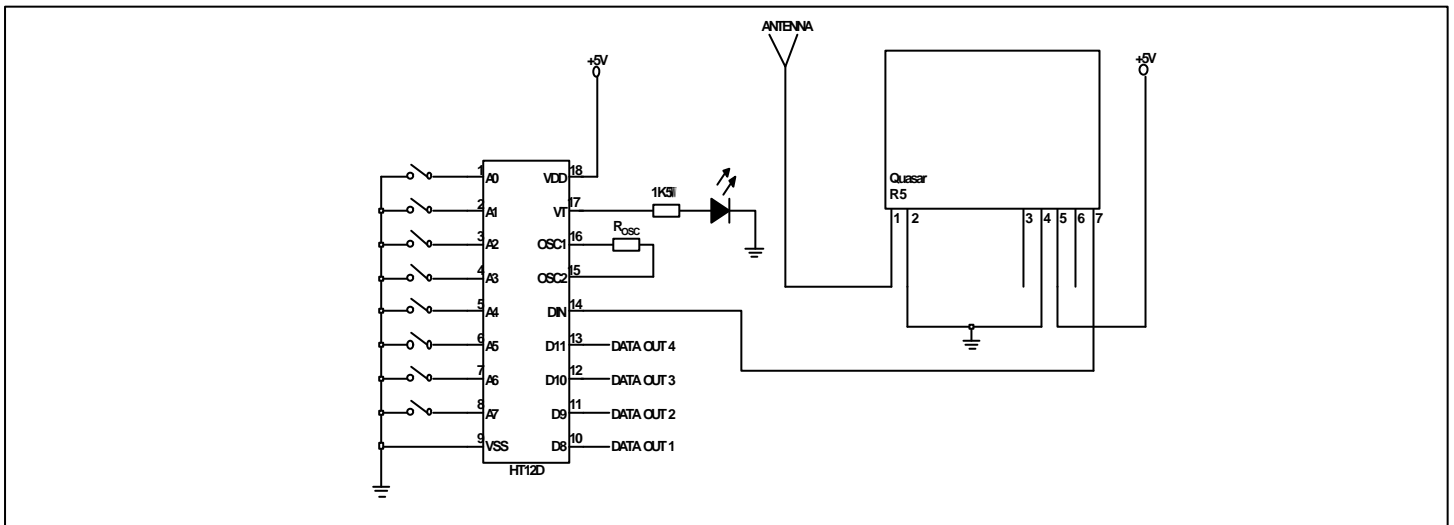
	Min.	Typ.	Max.	Dimension
DC LEVELS				
Supply Voltage (Pin 5)	4.5	5	5.5	V
Supply Current		4.8		MA
Supply Ripple	-	-	10	MV _{p-p}
Data Output High	4.0			V
Data Output Low			0.5	V
RF				
RF Sensitivity		-103		DBm
IF Bandwidth		230		KHz
Initial signal accuracy		±22		KHz
Max. RF input		20		DBm
EMC				
Spurious responses up to 1GHz		<60		DB
LO Leakage, conducted		<60		DBm
LO Leakage, radiated		<60		DBm
Dynamic Timings				
Power up to stable (with RF signal present)		TBA		mS
Signal to stable data (with power supply already on)		TBA		mS
Power up to valid RSSI (with RF signal present)		TBA		mS
Mark: space ratio		50		%
Bit rate	100		128000	bps

QFMT5 & QFMR5

Typical application circuit – QFMT5 Transmitter



Typical application circuit – QFMR5 Receiver



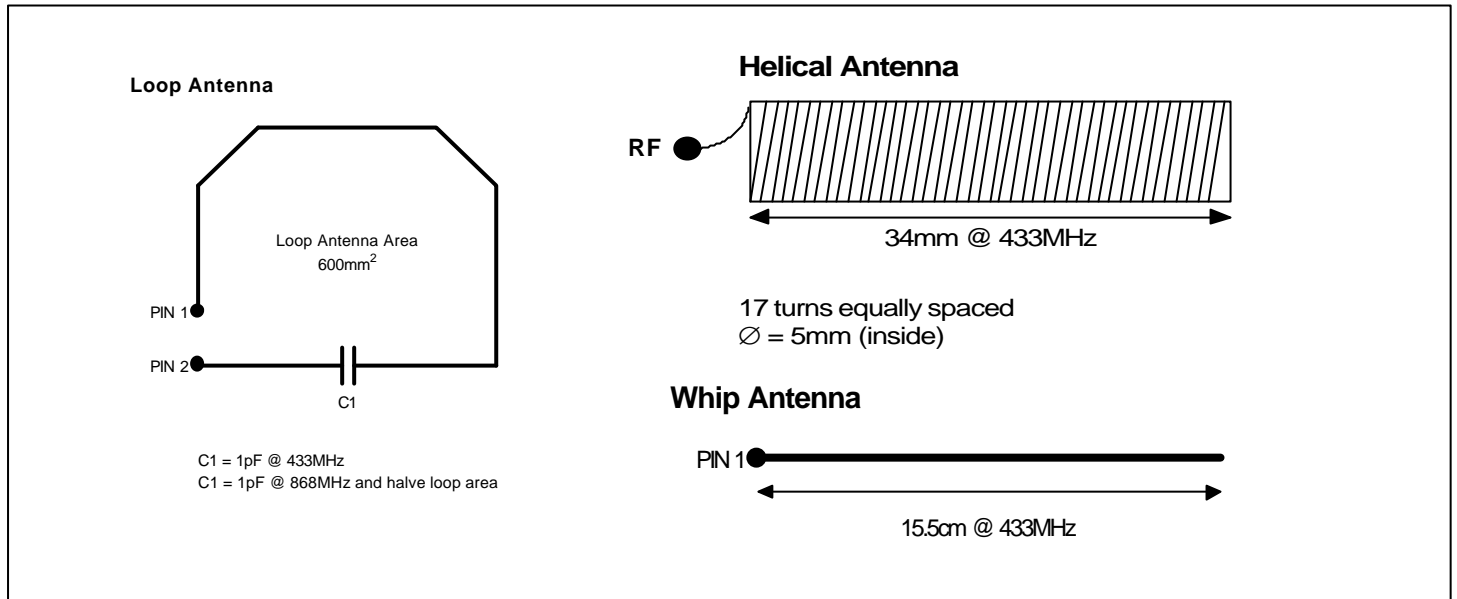
Antenna configuration

The design and positioning of the antenna is as crucial as the module performance itself in achieving a good wireless system range. The following will assist the designer in maximising system performance.

The antenna should be kept as far away from sources of electrical interference as physically possible. If necessary, additional power line de-coupling capacitors should be placed close to the module.

The antenna 'hot end' should be kept clear of any objects, especially any metal as this can severely restrict the efficiency of the antenna to receive power. Any earth planes restricting the radiation path to the antenna will also have the same effect.

Best range is achieved with either a straight piece of wire, rod or PCB track @ $\frac{1}{4}$ wavelength (15.5cm @ 433.92MHz). Further range may be achieved if the $\frac{1}{4}$ wave antenna is placed perpendicular in the middle of a solid earth plane measuring at least 16cm radius. In this case, the antenna should be connected to the module via some 50 ohm characteristic impedance coax



Loop Antenna

The loop antennae, is the cheapest and most compact of the three antennas. The antenna always takes up the form of a track on a PCB, the antenna consists of a feeder capacitor C1 which is connected directly to the transmit pin on the radio module, and a loop track which is grounded. This antenna gives the poorest performance of the three, and thus is essential that the tuning capacitors are adjusted for the best system performance.

Helical Antenna

The helical antenna provides a more compact antenna for mobile radio systems. A helical antenna for use at 433Mhz consists of 17 turns of wire wound closely round a 5mm diameter former. The antenna must be connected directly to the transmit pin of the radio module.

Whip Antenna

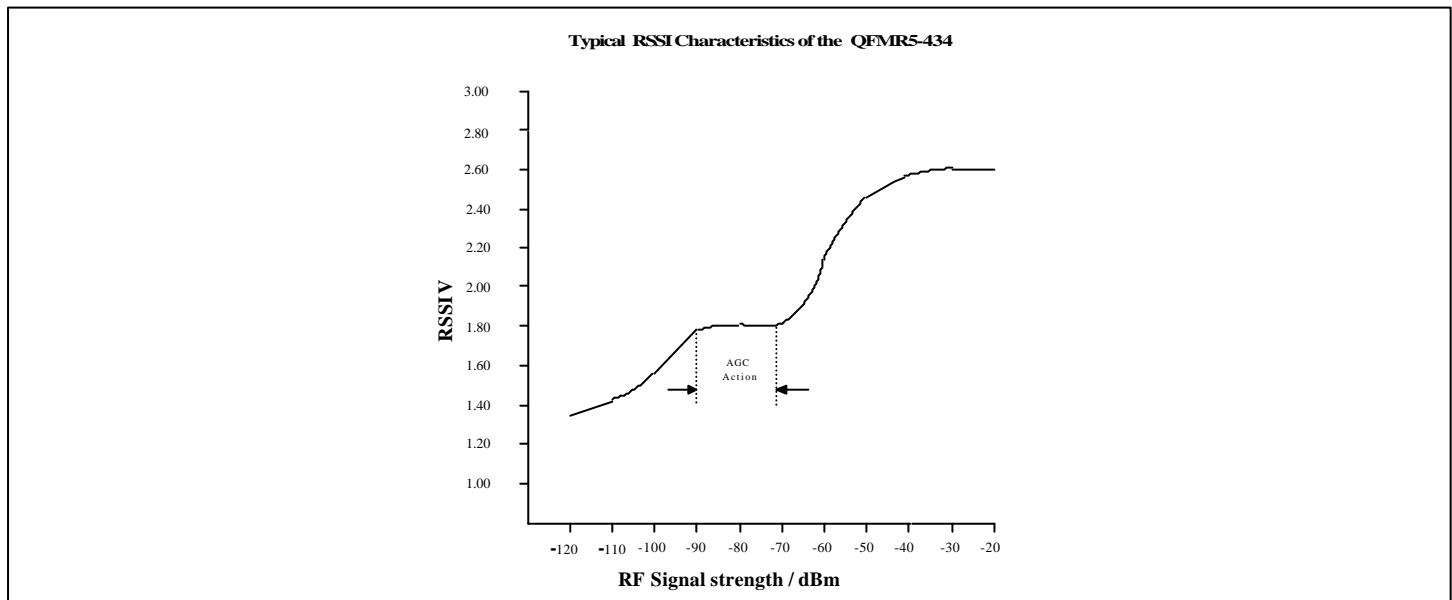
The whip antenna simply consists of a metal rod with a length of $\frac{1}{4}$ of the wavelength of the signal, which you wish to transmit. The whip must be directly connected to the transmit pin on the module.

QFMT5 & QFMR5

RSSI Values

The QFMR5 RSSI output provides a DC output proportional to the RF input signal. The table below shows the typical RSSI value depending on the RF signal strength.

RF Signal Strength / dBm	RSSI / V
-120	1.35
-110	1.41
-100	1.57
-90	1.79
-80	1.8
-70	1.8
-60	2.15
-50	2.45
-40	2.58
-30	2.59
-20	2.59



Ordering information

Description	Order Code
SIL FM Transmitter Module – 3V, 50 Kbps	QFMT5-433B3
SIL FM Transmitter Module – 5V, 50 Kbps	QFMT5-433B5
SIL FM Transmitter Module – 128K Kbps	QFMT5-433C
SIL FM Receiver Module – 15K Kbps	QFMR5-433A
SIL FM Receiver Module – 50K Kbps	QFMR5-433B
SIL FM Receiver Module – 128K Kbps	QFMR5-433C

Information contained in this document is believed to be accurate, however, no representation or warranty is given and no liability is assumed by okwelectronics.com. with respect to the accuracy of such information. Use of okwelectronics.com modules as critical components in life support systems is not authorised except with express written approval from okwelectronics.com.