M&C Option for Ku-band GaN 25W BUC: NJT8370

Appendix)
Specifications of Monitor & Control

Rev. 4.0
July 13, 2016

1. Interface Specifications

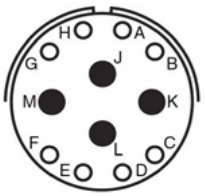
1-1. FSK Communication M&C

(1) Physical Interface	IF Connector: N-type or F-type, female Combine with IF signal and 10MHz Reference signal
(2) Transmitter Outputs	
a. Frequency	650 kHz ±5%
b. FSK deviation	±60 kHz nom. (+60 kHz mark)
c. Deviation tolerance	±50 kHz min. / ±70 kHz max.
d. Output Level	-10 dBm nom.
e. Output impedance	50 Ω
f. Start Tone	710 kHz (mark) / 10ms min
(3) Receiver Inputs	
a. Locking range	± 32.5 kHz
b. Input impedance	50 Ω
c. Input Sensitivity	-15 dBm min.

1-2. RS-232C Interface M&C

(1) Physical Interface: MS Connector: P/N PT02E-14-12P (025)

Pin Assignment:



Pin A: N.C.
Pin B: N.C.
Pin C: N.C.
Pin D: N.C.
Pin E: GND COMMON (RS-232C)
Pin F: N.C.
Pin G: RS-232C TxD*
Pin H: RS-232C RxD*
Pin J: DC Power (+) / Prime
Pin K: DC Power (-) / Return;
GND COMMON (RS-232C)
Pin L: N.C.
Pin M: N.C.

(2) Transmitter Outputs	
a. Output Voltage Swing	±5V min. /±5.4V typ.
b. Output Resistance	300Ω min. / 10MΩ typ.
(3) Receiver Inputs	
a. Input Voltage Range	±15 V
b. Input Threshold low	+0.6 V min.
c. Input Threshold High	+2.4 V max
d. Input Resistance	7 kΩ max

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2. Transmission Protocol

a. Operation Mode Binary
b. Transfer Rate 9600 bit/s
c. Data Format 1 start bit, 8 data bits, 1 stop bit
No Parity

ST	D0	D1	D2	D3	D4	D5	D6	D7	SP

Transmit ⟶

(The least significant bit (LSB) is sent first.)

ST: Start bit
D0: Data(LSB)

D7: Data(MSB)
SP: Stop bit

d. Maximum Response Time 50 ms
e. Massage Rate 1 every 20 ms

3. Packet Format

a. Data Packet Length 7 Bytes
b. Byte Configuration

Byte	Command (IDU to BUC)	Response (BUC to IDU)
1st	BUC Address (*1)	BUC Address (*2)
2nd	Command	Data Byte 1
3rd	Data Byte 1	Data Byte 2
4th	Data Byte 2	Data Byte 3
5th	Data Byte 3	Data Byte 4
6th	Data Byte 4	Data Byte 5
7th	Check Sum (*3)	Check Sum (*3)

*1: Initial setting of a BUC address is 0x01.
*2: Responder address is shifted left by 4 bits.
*3: Algebraic sum of bytes 1 through 6.
*Note: Spare bytes are always filled with 0xAA (10101010).

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4. Command & Response Message Structure

The BUC status is stored to internal EEPROM.
The last BUC state is stored to internal EEPROM, so when the BUC is re-turned DC power on again, the state is reproduced last BUC condition.

4-1. Command Message Structure (IDU to BUC)

a. Request Status

This command can acquire output power level, alarm status, BUC class, and temperature etc.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Request Status	0x01
3	Data Byte 1	Not used	0xAA
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	01	AA	AA	AA	AA	CHK

b. Set Transmit On/Off State

This command can set a state of transmit on and transmit off.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Tx On/Off	0x02
3	Data Byte 1	Tx Control	Off:0x00/On:0x01
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	02	01	AA	AA	AA	CHK

c. Set Attenuator

This command can set the step attenator with 0.5 dB step in the BUC.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Set Attenuator	0x05
3	Data Byte 1	Attenuator Selection 1 or 2	Att.1 0x01 Att.2 0x02 *1
4	Data Byte 2	Setting Att. in 10dB digit	0x00 or 0x01 *2
5	Data Byte 3	Setting Att. in 1dB digit	0x00 to 0x09 *2
6	Data Byte 4	Setting Att. bit in 0.5dB digit	0x00 or 0x05 *2
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	05	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.

*2: Dynamic range and step size of the step attenuator: 15.5dB in 0.5dB step

ex) 12.5dB : Data byte 2 is 0x01
Data byte 3 is 0x02
Data byte 4 is 0x05

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d. Get Attenuator

This command can check the step attenator setting value in the BUC.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Get Attemuator	0x06
3	Data Byte 1	Attenuator Selection 1 or 2	Att.1 0x01 Att.2 0x02 *1
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	06	01	AA	AA	AA	CHK

*1: Att.1 is available, Att.2 is not available.

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4-2. Response Message Structure (BUC to IDU)

a. Request Status

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Level Byte 1	MS byte of Tx Output Power	*1
3	Level Byte 2	LS byte of Tx Output Power	*1
4	Temperature	Temperature in deg. C	*2
5	Status Byte 1	Bit 0: Temperature Out-of-Range	1:Fail , 0:Normal *3
		Bit 1: PLL Out-of-Lock	1:Fail , 0:Normal *3
		Bit 2: Checksum Error	1:Error , 0:Norma *3
		Bit 3: Tx Status	1:Tx On , 0:Tx Of *3
		Bits 4 thru 7: BUC Power Class	0x1 to 0xA *3
6	Status Byte 2	Bits 0 - 3: Not used	Fixed 0xA
		Bits 4 - 7: Software Version	0x0 to 0xF
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

10	10	FE	D8	88	1A	CHK

*1: Data Field Definition for Tx Output Power

Output power is the number which changed hexadecimal data into the decimal number and was divided by 100.

ex) Output Power Data

Level Byte 1 is 0x10
Level Byte 2 is 0xFE
} 0x10FE → +43.50 dBm

*2: Data Field Definition for Temperature

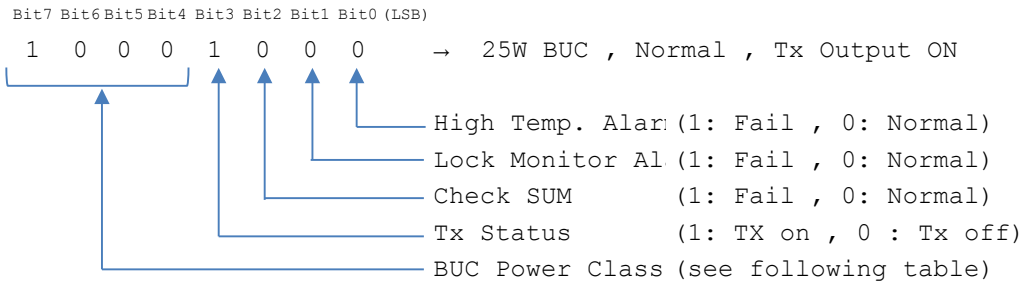
Temperature data is from -128°C to +127°C in two's complement (1°C step).

ex) Temperature Data

Byte of Temperature is 0xD8 → 11011000 = -40 °C
Byte of Temperature is 0xFF → 11111111 = -1 °C
Byte of Temperature is 0x40 → 01000000 = 64 °C

*3: Data Field Definition for Status Byte 1

ex) Status Byte 1 is 0x88



BUC Power Class table

Value	0x1	0x2	0x3	0x4	0x5	0x6	0x7	0x8	0x9	0xA
Power	2W	4W	5W	8W	10w	16W	20W	25W	40W	60W

*4: Data Field Definition for Status Byte 2

ex) Status Byte 2 is 0x1A→ Firmware Version Ver.1

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b. Set Transmit On/Off State

i) In case of FSK Communication M&C

The BUC responds the same message as 'Request Status' after the BUC set the taransmit on/off state in accordance with the command message

ex)	10	10	FE	D8	88	1A	CHK

ii) In case of RS-232C Interface M&C

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Tx On/Off	0x02
3	Data Byte 1	Tx Control	Off:0x00/On:0x01
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)	10	02	01	AA	AA	AA	CHK

c. Set Attenuator

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Set Attenuator	0x05
3	Data Byte 1	Attenuator Selection 1or 2	Att.1 0x01 Att.2 0x02 ***1**
4	Data Byte 2	Set Att. bit in 10 dB digit	0x00 or 0x01
5	Data Byte 3	Set Att. bit in 1 dB digit	0x00 to 0x09
6	Data Byte 4	Set Att. bit in 0.5 dB digit	0x00 or 0x05
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)	01	05	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.

d. Get Attenuator

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Get Attenuator	0x06
3	Data Byte 1	Attenuator Selection 1or 2	Att.1 0x01 Att.2 0x02 ***1**
4	Data Byte 2	Set Att. bit in 10 dB digit	0x00 or 0x01
5	Data Byte 3	Set Att. bit in 1 dB digit	0x00 to 0x09
6	Data Byte 4	Set Att. bit in 0.5 dB digit	0x00 or 0x05
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)	01	06	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.