



COMPACT LOW POWER RF DRIVER

RF Driver for Acousto-Optic Modulators and Q-Switches

PRELIMINARY PRODUCT DATASHEET

This module (QCXXX-YYDC-ZZZ-AAV) is a compact low power RF driver, designed to drive an acousto-optic (AO) modulator or Q-switch.

The unit has two digital modulation inputs: fixed and variable. These controls allow the customer to issue a pulse command of a “fixed” pulse width, the duration determined by the driver’s pulse width control (settable by the customer), or issue a “variable” pulse command, the duration determined by the input signal’s pulse width.

The output power is controlled by the analog input, where the mode of operation is defined by ZZZ = A05 normal analog mode, or R05 analog switched to full RF mode or a triggered RF Ramp Down mode where ZZZ = FPS first pulse suppression mode or PPK pre-pulse kill mode.

Other variations of these modes are also available. The choices of frequency (XXX), output power (YY), and power control (ZZZ) option are “factory set” when ordered. This driver has a zero crossing function where the output pulse can be synchronized to the zero crossing point of the RF Energy. When enabled the pulse to pulse stability is improved.

This product conforms to the requirements of the European Union Directive 2011/65/EU of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).



Key Features

- 24, 27.12, 40.68, 68, 80, or 110 MHz RF frequency (XXX)
- 0.01% quartz stabilized
- Up to 24 W RF power output (YY)
- Two TTL digital modulation inputs: fixed and variable pulse width
- Up to 1 MHz pulse rate in Q-switch applications.
- Up to 10 MHz pulse rate in pulse picking applications
- Analog modulation or triggered RF Ramp Down Mode (ZZZ)
- Synchronization to RF by ‘zero cross’

Key Benefits

- Fault protection on low power, high power, and high VSWR
- Operates on 12, 15 or 24 VDC (AAV) (factory set)

Applications

- Powering an AO Q-switch used to spoil the “Q” of a CW laser in order to output an intense pulse of light
- Powering an AO modulator to pick pulses out of an optical pulse train

QCXXX-YYDC-ZZZ-AAV

Technical Data

Supply voltage	+12, +15 or +24 VDC (factory set)	
Supply current	≤ 3 A	
RF power output	2 to 24 W	
Output impedance	50 Ω	
Output frequency	XXX = 024, 027, 041, 068, 080, or 110 as standard where RF Frequency = 24.00, 27.12, 40.68, 68.00, 80.00 or 110.00 MHz	
Frequency stability	± 0.01%	
Extinction ratio	≥ 50 dB	
Harmonic distortion	≤ -20 dB for units with output power ≤ 15 W ≤ -15 dB for units with output power > 15 W	
Spurious levels	≤ -50 dBc	
Analogue modulation input	Impedance	1.5 kΩ
	Voltage range	0 to +5 VDC
The voltage range corresponds to 0 to 100% of the pre-adjusted maximum RF output power. For units configured with A05, R05 and M05		
Digital modulation inputs	Impedance	High impedance
	Level	TTL compatible (V _{IL} < 0.8V, V _{IH} > 2.0 V)
Mod in fixed	Standard	Triggered on rising edge
	Inverted digital input option (NEG)	Triggered on falling edge
Mod in variable	Standard	TTL V _{IH} = RF OFF
	Inverted digital input option (NEG)	TTL V _{IL} = RF OFF
FPS/PPK input	Impedance	High impedance
	Level	TTL compatible (V _{IL} < 0.8V, V _{IH} > 2.0 V)
Trigger	Standard	Triggered on rising edge
	Inverted digital input option (NEG)	Triggered on falling edge
For units configured with FPS, PPK		
Digital/analogue modulation RF rise time/fall time (10 to 90% RF power) ¹	≤ 35 ns	
Zero crossing enable input	Impedance	High impedance
	Level	TTL compatible (V _{IL} < 0.8V, V _{IH} > 2.0 V)
Trigger	Standard	TTL V _{IH} or no connection - disabled, TTL V _{IL} - enabled
	Active zero cross option (ZC) ²	TTL V _{IH} or no connection - enabled, TTL V _{IL} - disabled
Sync output	3.3 V signal, inverted in ZC units	
Enable input	< 3 W dissipation in standby mode	
Normal operation	TTL V _{IH} or no connection	
Standby mode	TTL V _{IL}	
Driver reset	Momentary TTL V _{IL}	

¹ into 50 Ω load

² ZC option enables zero cross by default

Output Indicators

STATUS INDICATOR LED	
Red	Normal operation
Green	Standby mode
Yellow	Fault condition

Environmental Conditions

Operating temperature	+10 to +55°C case temperature, non-condensing
Storage temperature	-20 to +85°C, non-condensing

Connectors and Mechanical Data

RF output connector	SMA Female (recommended torque 0.45 Nm max 0.6 Nm).
Power and control connector	Molex 0430451221
Mating connector	Molex 0430251200 with Molex 0430300008 crimp terminals
Cooling method	Contact cooled
Cooling spec	The driver must be attached to a heatsink capable of dissipating; 36W @ 12 V 45W @ 15 V 72W @ 24 V
Weight (driver only)	192 grams

Connector Pinout

POWER AND CONTROL CONNECTOR

12 positions header connector 0.118" (3.00mm)

Pin assignment

All input signals refer to ground (GND) unless otherwise stated. All outputs are open collector type 25 mA max current drain.

Pin 1	SYNC (out)	Pin 2	FPS trigger (in)
Pin 3	Mod in fixed (in)	Pin 4	GND
Pin 5	Mod in variable (in)	Pin 6	Mod in analog (in)
Pin 7	Zero cross enable (in)	Pin 8	Low power fault (out)
Pin 9	High power fault (out)	Pin 10	High VSWR load fault (out)
Pin 11	Enable (in)	Pin 12	VDC

Absolute Maximum Ratings

Important: Failure to remain within stated rating may cause instantaneous and irreparable damage to the driver

Supply voltage	+27 VDC	
RF power output	No DC feedback allowed	
TTL/analog signal inputs	-0.5 V to +5.5 V	
Mod in fixed minimum pulse width	50 ns	
Modulation repetition rates	Mod in fixed	1 Hz to 1 MHz
	Mod in variable	DC to 10 MHz

RF power (W)	Frequency (MHz)					
	24.00	27.12	40.68	68.00	80.00	110.00
Supply voltage (V)						
12	10	10	10	10	10	10
15	24	24	24	20	20	10
24	24	24	24	24	24	10

Adjustments

RF Power Level Adjustment	Adjusts the output RF Power - clockwise increases power output
LP - Low Power Set Point	Adjusts the minimum power threshold. The LP Fault output goes LOW if the output power is below this level ³
HP - High Power Set Point	Adjusts the maximum power threshold. The HP Fault output goes LOW if the output power is greater than this level.
High VSWR Set Point (HVSWR)	Adjusts the module's tolerance for a mismatched load connected to RF Out. If a mismatch is detected, the HVSWR Fault output goes LOW, the status LED will change to YELLOW, and the driver will cease output until reset by momentarily entering standby mode.
Pulse width (Mod in fixed)	Adjusts the length of time the driver outputs no RF energy after receiving a Fixed Input trigger. 1 μ s to 20 μ s.

The following adjustments are used on units configured with FPS or PPK:

FPS Start	Adjusts the initial power level of the first pulse.
FPS Slope	Adjusts how quickly the RF pulses return to their normal level after the FPS has been triggered. 20 μ s to 300 μ s.
FPS Window	Adjusts the duration of the suppression pulse cycle. 20 μ s to 300 μ s.

³ The LP Fault output will be suppressed whilst modulating the RF power via analog modulation

Available First Pulse Suppression Modes

Modulation operating mode is "factory set" internally

FPS (First Pulse Suppression)	See figure 2
PPK (Pre Pulse Kill)	See figure 3
R05 (RF Switched to analog control)	See figure 4
A05 (Analog control)	See figure 5
M05 (Analog control configured for AOM)	See figure 6

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Figure 2 First Pulse Suppression (FPS) Operating Mode Control Diagram

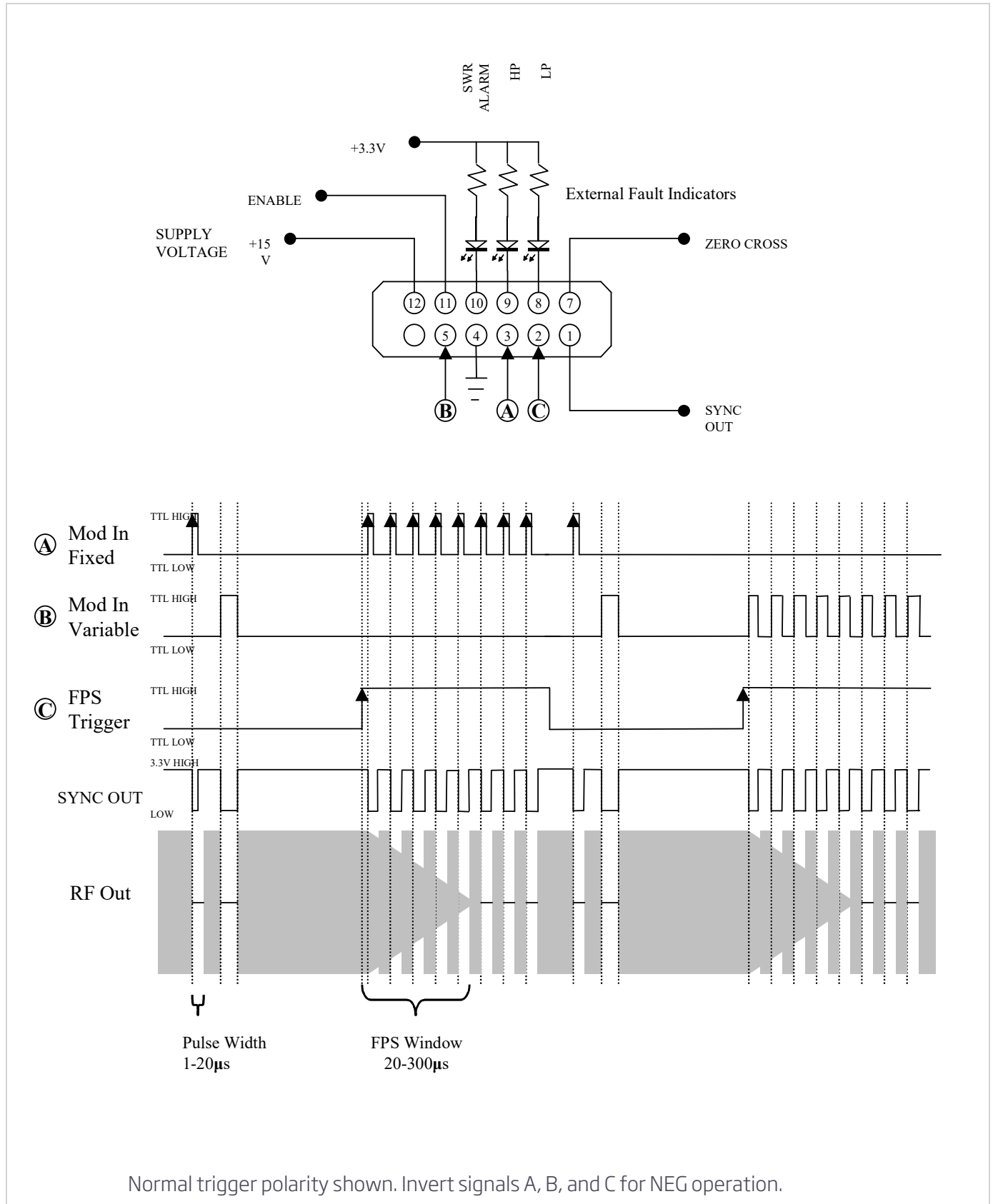


Figure 3 Pre Pulse Kill (PPK) Operating Mode Control Diagram

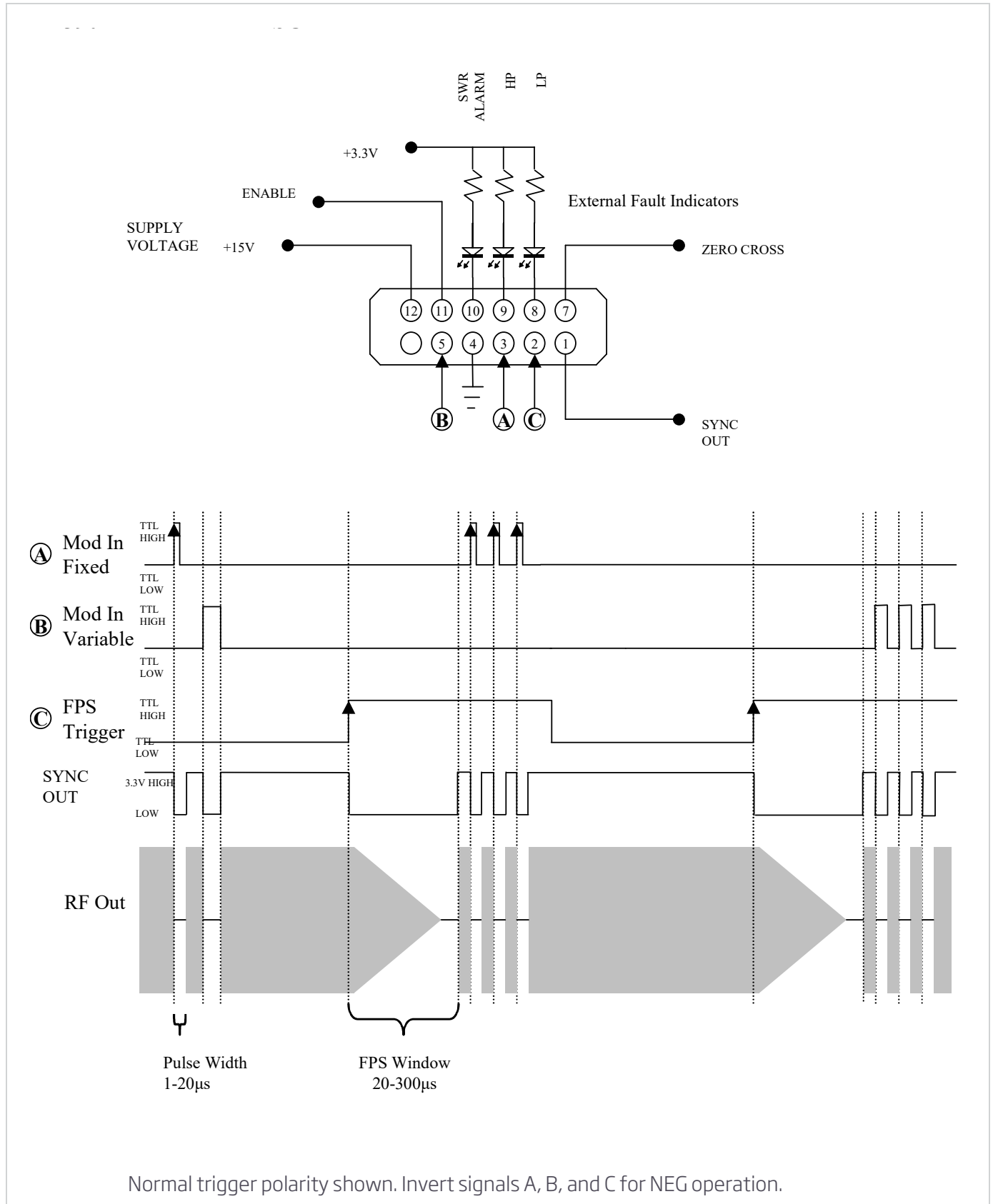


Figure 4 Analog Control (R05) Operating Mode Control Diagram

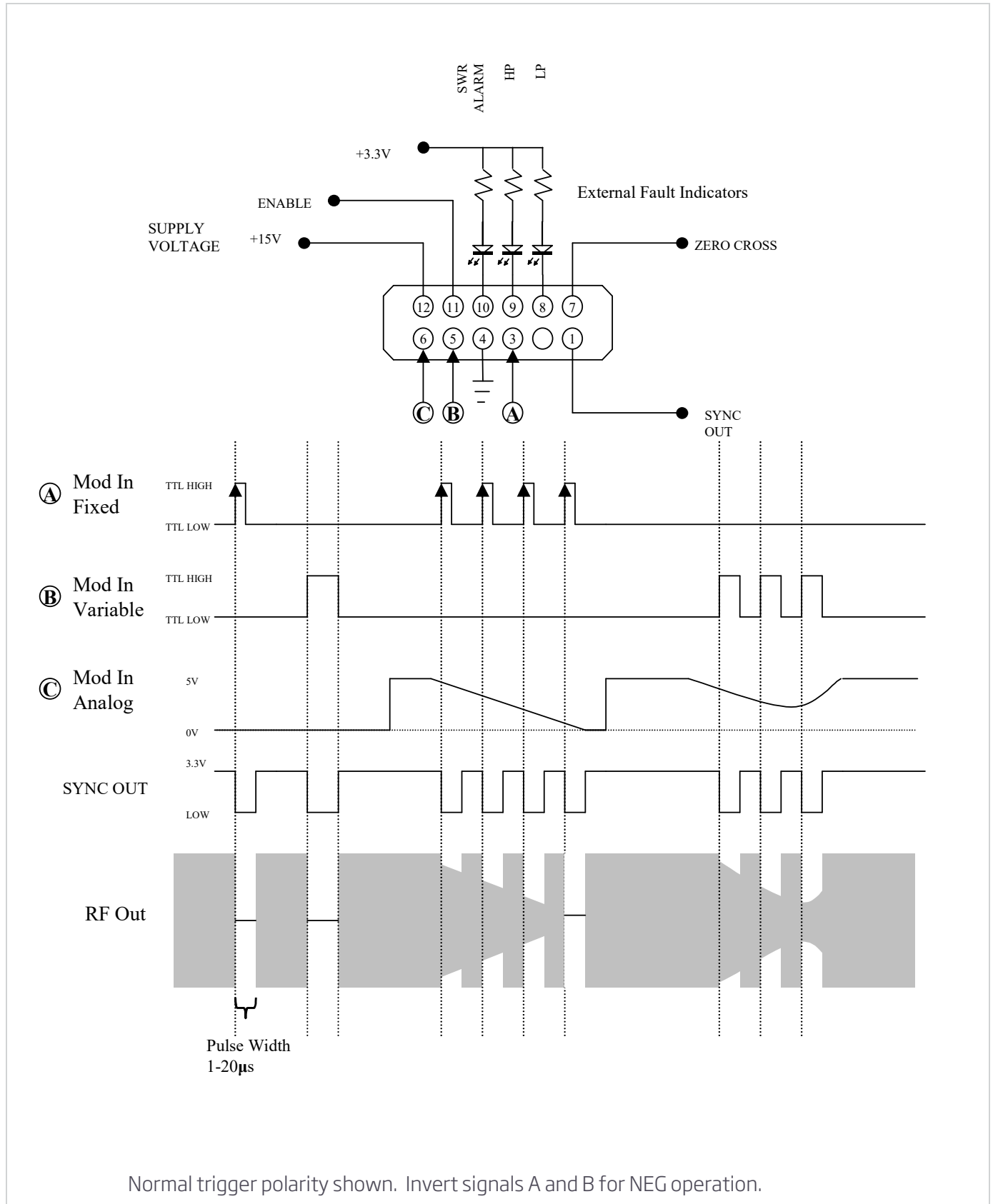


Figure 5 Analog Control (A05) Operating Mode Control Diagram

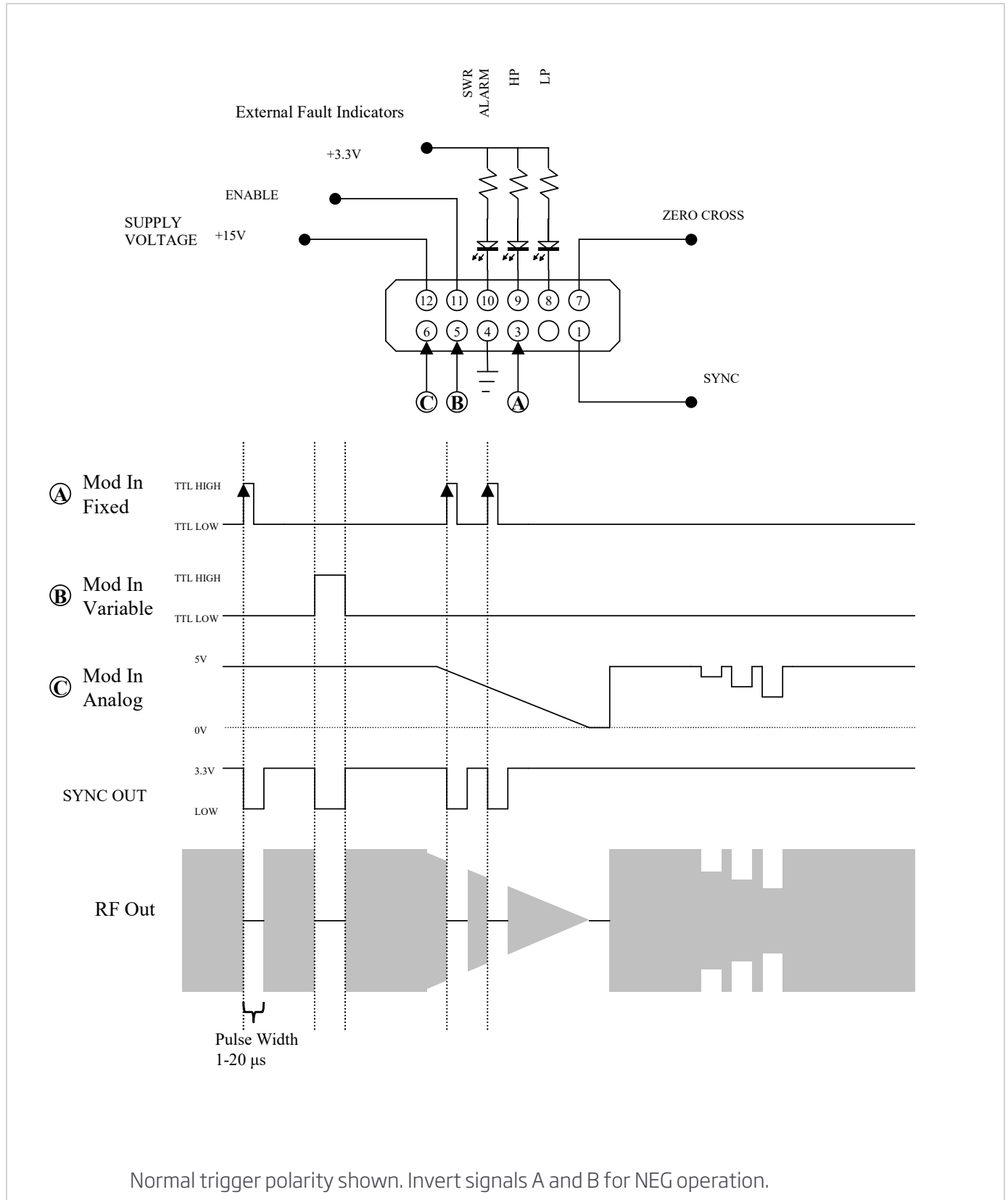
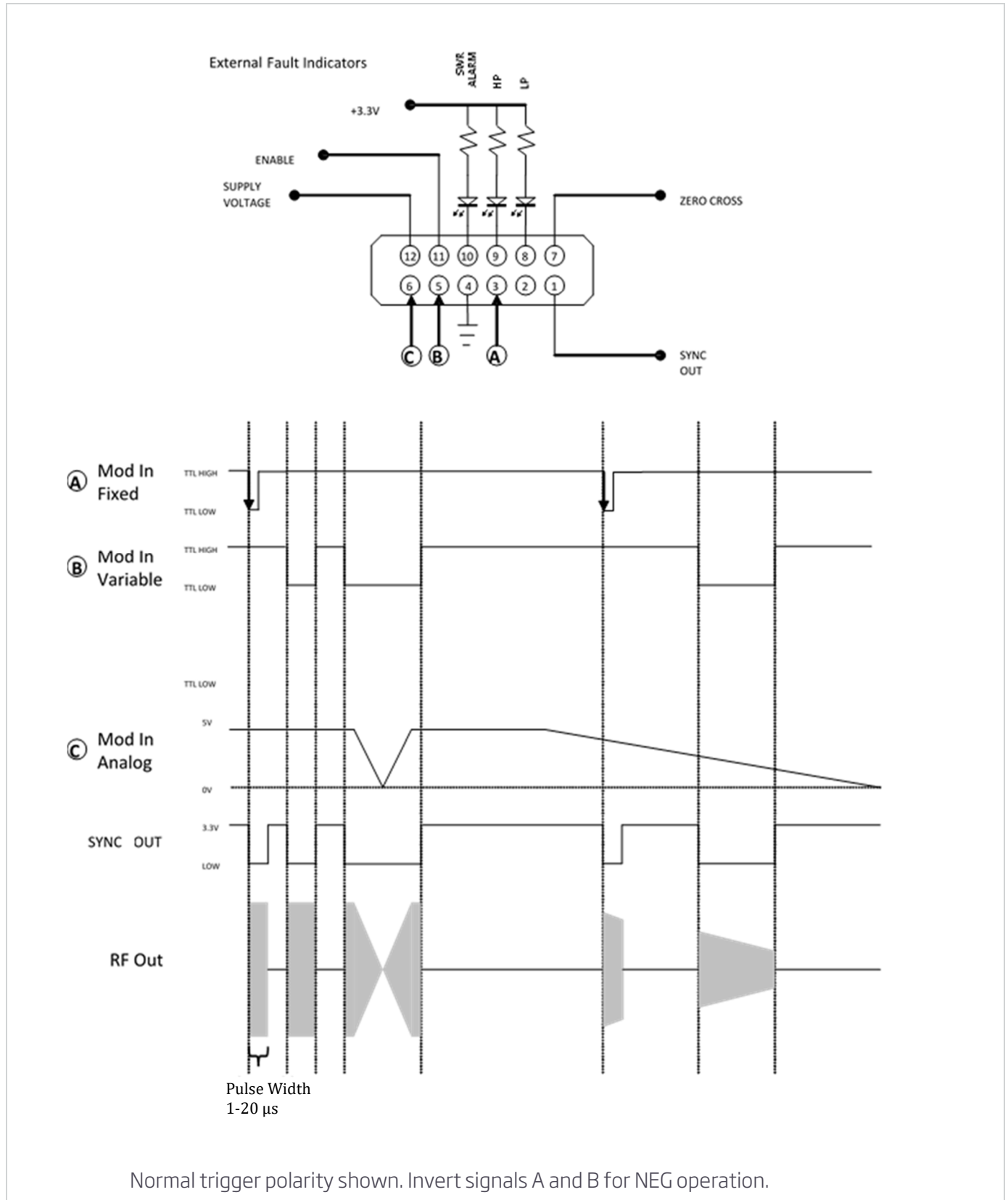
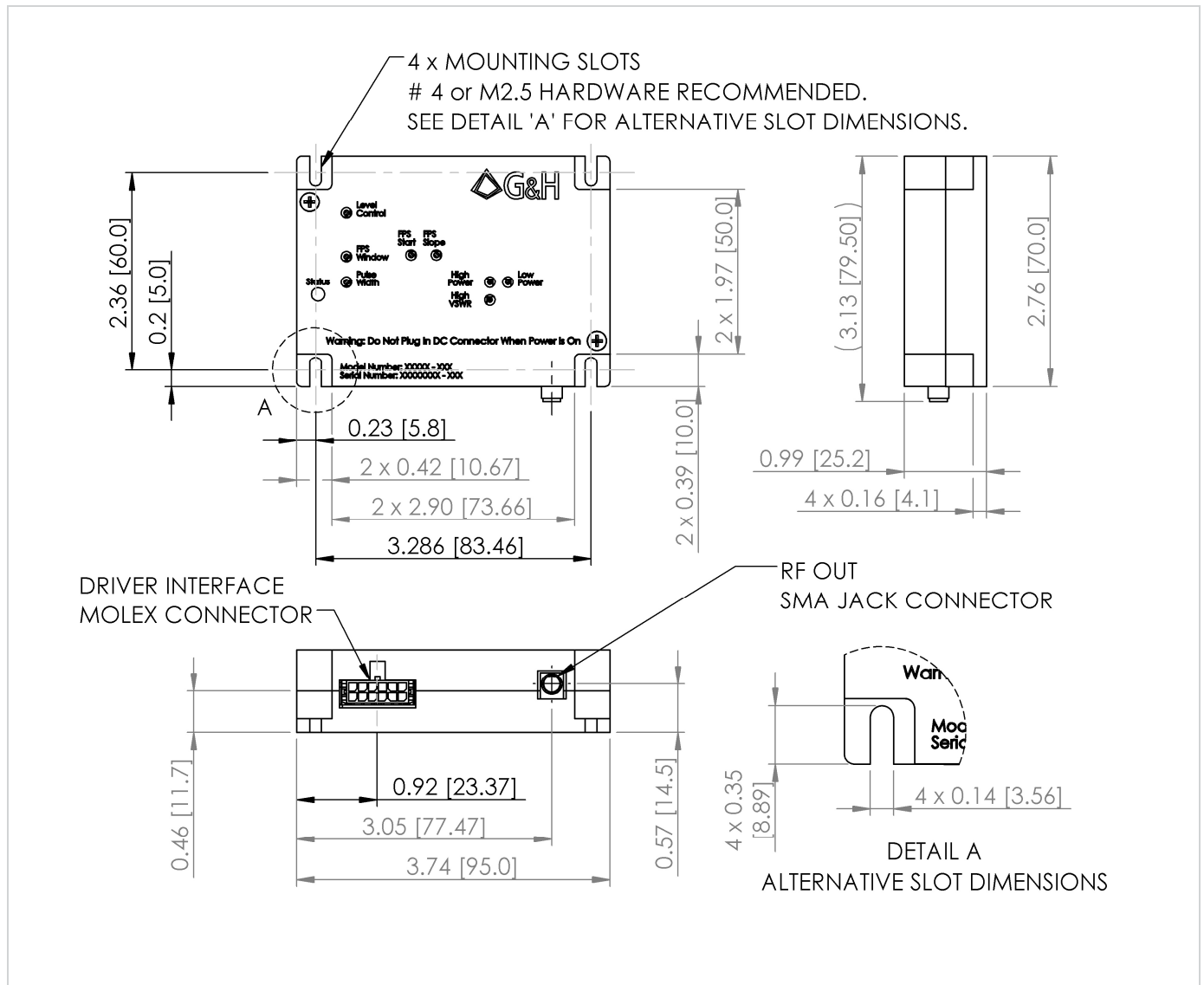


Figure 6 Analog Control (M05) With AOM Compatible Output Operating Mode Control Diagram



Drawing Dimensions in inches and [mm]



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Order codes

Order codes are comprised of a standard device prefix followed by code letters or numbers which correspond to available options.

Example: QC027-20DC-A05-15V

A 27 MHz RF driver with two TTL digital modulation inputs (fixed and variable pulse width) and an analog input (A05) which enables control of the RF output power. Designed to drive an AO Q-switch requiring 20 W RF power or less. Delivered as a RoHS compliant, contact cooled OEM module.

Order code

	①	②	③	④	⑤	⑥	⑦	⑧																	
Q	C	X	X	X	-	Y	Y	D	D	C	-	Z	Z	Z	-	A	A	V	-			-			
①	Characteristic	Frequency																							
	Code	024 = 24.00 MHz			027 = 27.12 MHz			041 = 40.68 MHz			068 = 68.00 MHz			080 = 80.00 MHz			110 = 110.00 MHz								
②	Characteristic	RF output power																							
	Code	2 to 24 W Range (refer to table on page 4 for maximum power for chosen frequency)																							
③	Characteristic	Digital modulation																							
	Code	D = Standard									DN = Inverted digital														
④	Characteristic	Cooling																							
	Code	C = Contact cooled (legacy denotation all QC drivers are contact cooled)																							
⑤	Characteristic	First Pulse Suppression Mode																							
	Code	A05 = Analog power control			R05 = Analog power control (Switched)			FPS = First pulse suppression			PPK = Pre pulse kill			M05 = Analog control configured for AOM											
⑥	Characteristic	Supply voltage (V)																							
	Code	12 V						15 V						24 V											
⑦	Characteristic	Additional options (optional)																							
	Code	ZC = Active zero cross (enabled by default)																							
⑧	Characteristic	Custom unit identification (optional)																							
	Code	Usually customer specific denotation																							