



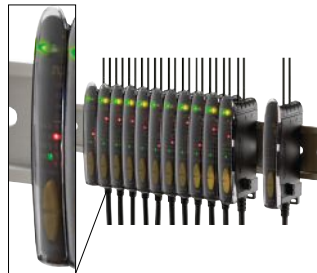
D10 Series High-Performance Fiber Optic Sensing

- Features advanced fiber optic amplifier for use with plastic fibers
- Available with a numeric or bargraph display on *Expert™* models
- Delivers high-performance, low-contrast sensing with automatic TEACH options or manual adjustment
- Available with visible red or green beam
- Available in Light or Dark Operate
- Includes specially designed models for reliable detection of objects as small as 1.5 mm
- Features bussable models for side-by-side mounting and simplified wiring of up to 16 sensors
- Features thin 10 mm housing for standard 35 mm DIN-rail mounting
- Cordsets and brackets see page 260



D10 *Expert™* with Numeric Display

- Numeric display of signal strength and operating status
- Two output options: two discrete outputs in the same sensor; or discrete output and either a 4-20 mA current or a 0-10 V dc voltage analog output in the same sensor
- Push buttons for easy-to-set static, dynamic light set, dark set and window set programming
- Manual fine tuning and remote configuration using TEACH wire
- Four mode power and speed selection with automatic crosstalk avoidance circuitry
- Response times as fast as 50 microseconds



D10 *Expert™* with Bargraph Display

- Easy-to-read 8-segment light bar display indicator for TEACH and signal strength
- Bipolar discrete outputs: one current sourcing (PNP) and one current sinking (NPN)
- Push buttons for easy-to-set static, dynamic light set, dark set and window set programming
- Manual fine tuning
- Bussable power models with improved temperature compensation for side-by-side mounting and simplified wiring of up to 16 sensors
- Selectable high-speed mode option for 200 microsecond response



D10—Discrete Output

- 12-turn manual sensitivity adjustment
- Pulse rate LED indicator for signal strength
- Bipolar discrete outputs: one current sourcing (PNP) and one current sinking (NPN)
- Response time as fast as 200 microseconds



D10 *Expert™* Small Object Counter

- Reliable low-contrast sensing for small object counting
- Easy-to-set selectable threshold with automatic compensation algorithm to compensate for dust or contamination on the fiber optic array and for ambient temperature changes
- Single discrete output plus Health mode output to indicate preventative maintenance is required
- A choice of three standard size fiber optic assemblies
- Custom size fibers for your application
- User-configurable Dynamic Event Stretcher (DES) to prevent double counting of objects
- Push buttons or remote wire for easy sensor configuration

D10 Expert™ with Numeric Display—Dual Discrete, 12-24 V DC

 Visible Red LED
 Visible Green LED

Sensing Mode	Range	Connection	Models Dual NPN	Models Dual PNP
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See datasheet for range information.	2 m	D10DNFP	D10DPFP
		6-pin Snap-on Pico QD	D10DNFPQ	D10DPFPQ
 PLASTIC FIBER		2 m	D10DNFPG	D10DPFPG
		6-pin Snap-on Pico QD	D10DNFPGQ	D10DPFPGQ

D10 Expert™ with Numeric Display—Analog/Discrete, 12-24 V DC

 Visible Red LED
 Visible Green LED

Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See datasheet for range information.	2 m	4-20 mA	D10INFP	D10IPFP
		6-pin Snap-on Pico QD	4-20 mA	D10INFPQ	D10IPFPQ
 PLASTIC FIBER		2 m	4-20 mA	D10INFPG	D10IPFPG
		6-pin Snap-on Pico QD	4-20 mA	D10INFPGQ	D10IPFPGQ

D10 Expert™ with Numeric Display—Analog/Discrete, 15-24 V DC

 Visible Red LED
 Visible Green LED

Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 293 or reference datasheet for range information.	2 m	0-10V	D10UNFP	D10UPFP
		6-pin Snap-on Pico QD	0-10V	D10UNFPQ	D10UPFPQ
 PLASTIC FIBER		2 m	0-10V	D10UNFPG	D10UPFPG
		6-pin Snap-on Pico QD	0-10V	D10UNFPGQ	D10UPFPGQ

For more specifications see pages 260-264.

Connection options: A model with a QD requires a mating cordset (see page 260).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **D10DNFP W/30**).

D10 Expert™ with Bargraph Display—Discrete

➔ Visible Red LED

➔ Visible Green LED

Sensing Mode	Range	Connection	Output Type	Supply Voltage	Description	Models
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 274 or reference datasheet for range information.	2 m	Bipolar NPN/PNP	10 to 30 V dc	Standard models	D10BFP
		6-pin Snap-on Pico QD	Bipolar NPN/PNP	10 to 30 V dc	Standard models	D10BFPQ
 PLASTIC FIBER		2 m	Bipolar NPN/PNP	10 to 30 V dc	Standard models	D10BFPG
		6-pin Snap-on Pico QD	Bipolar NPN/PNP	10 to 30 V dc	Standard models	D10BFPGQ
Bussable Power Models						
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 274 or reference datasheet for range information.	2 m	Bipolar NPN/PNP	12 to 30 V dc	Main unit	D10B5FP
		2 m	PNP	12 to 30 V dc	Sub unit	D10B2PFP
		2 m	NPN	12 to 30 V dc	Sub unit	D10B2NFP

D10—Discrete, 10-30 V DC

➔ Visible Red LED

➔ Visible Green LED

Sensing Mode	Range	Connection	Output Type	Response Time	Models
 PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 274 or reference datasheet for range information.	2 m	Bipolar NPN/PNP	500 microseconds	D10AFP
		4-pin Snap-on Pico QD	Bipolar NPN/PNP	500 microseconds	D10AFPQ
 PLASTIC FIBER		2 m	Bipolar NPN/PNP	500 microseconds	D10AFPG
		4-pin Snap-on Pico QD	Bipolar NPN/PNP	500 microseconds	D10AFPGQ
 HIGH-SPEED PLASTIC FIBER	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 274 or reference datasheet for range information.	2 m	Bipolar NPN/PNP	200 microseconds	D10AFPY
		4-pin Snap-on Pico QD	Bipolar NPN/PNP	200 microseconds	D10AFPYQ
 HIGH-SPEED PLASTIC FIBER		2 m	Bipolar NPN/PNP	200 microseconds	D10AFPGY
		4-pin Snap-on Pico QD	Bipolar NPN/PNP	200 microseconds	D10AFPGYQ

For more specifications see pages 260-264.

Connection options: A model with a QD requires a mating cordset (see page 260).
 For 9 m cable, add suffix **W/30** to the 2 m model number (example, **D10UNFP W/30**).

D10 Expert™ Small Object Counter with Numeric Display—Discrete, 12-24 V DC

➔ Visible Red LED

Sensing Mode/LED	Connection	Output	Sensor Models
<p>PLASTIC FIBER</p>	2 m	NPN	D10DNCFP
	6-pin Snap-on Pico QD		D10DNCFPQ
	2 m	PNP	D10DPCFP
	6-pin Snap-on Pico QD		D10DPCFPQ

Fiber Optic Arrays

Detection Window Dimensions**	Fiber Exit	Minimum Object Detection†	Array Models*
10 x 25 mm	Side Exit	1.5 mm	PFCVA-10X25-S
	End Exit		PFCVA-10X25-E
25 x 25 mm	Side Exit	3 mm	PFCVA-25X25-S
	End Exit		PFCVA-25X25-E
34 x 25 mm	Side Exit	4 mm	PFCVA-34X25-S
	End Exit		PFCVA-34X25-E

For more specifications see pages 260-264.

Connection options: A model with a QD requires a mating cordset (see page 260).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **D10DNDFP W/30**).

* Custom fiber arrays and mounting configurations are possible. Consult factory for assistance with your small object counting application.

** For detailed dimension drawings of fibers see below.

† With 2% Threshold Offset Percentage



D10 Expert™ Models
with Numeric Display



D10—Discrete
Models










D10 Expert™ Models
with Bargraph Display

Cordsets

Pico QD (for ..Q7 or ..Q models)

See page 904

Length	Snap-on			
	4-Pin Straight	6-Pin Straight	4-Pin Right-Angle	6-Pin Right-Angle
2.00 m	 PKG4-2	 PKG6Z-2	 PKW4Z-2	 PKW6Z-2
2.00 m	—	 PKG6Z-9	—	 PKW6Z-9


 Additional cordset information available. See page 902.

Brackets



D10

See page 860	See page 860	See page 861
DIN-35...	SMBR55F01	SMBR55FRA




 Additional brackets and more information available. See page 852.


D10 Expert™ with Numeric Display—Dual-Discrete Specifications

Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 274)		
Supply Voltage and Current	12 to 24 V dc (10% max. ripple) at less than 65 mA, exclusive of load		
Supply Protection Circuitry	Protected against reverse polarity and transient voltage		
Output Configuration	Two independently configured current sourcing (PNP) or current sinking (NPN) solid-state transistors, depending on model		
Output Rating	150 mA max. load OFF-state leakage current: less than 10 µA at 24 V dc ON-state saturation voltage: NPN: less than 1.5 V at 150 mA load PNP: less than 2.5 V at 150 mA load		
Output Protection Circuitry	Protected against false pulse on power-up and continuous short-circuit		
Output Response Time	Programmable, 50 microseconds, 200 microseconds, 1 millisecond, 2.5 milliseconds		
Delay at Power-up	Less than 1 second; outputs do not conduct during this time		
Adjustments	Two push buttons or remote programming of (TEACH) switching threshold response time, OFF-delay, Light/Dark Operate, and display		
Indicators	Four-digit digital display plus LED indicators for active channel, push-button lockout, OFF-delay and Light/Dark Operate selection; two yellow LED output indicators		
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover		
Environmental Rating	IEC IP50; NEMA 1		
Connections	PVC-jacketed 2 m or 9 m 6-wire integral cable, or integral 6-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately. See page page 260.		
Operating Conditions	Temperature: -20° to +55° C		Storage Temperature: -20° to +80° C
	Relative humidity: 90% @ 50° C		
	Number of Devices Stacked	Ambient Temperature Rating	Load Specification
	3	55° C	150 mA
7	50° C	50 mA	
10	45° C	50 mA	
Installation	35 mm DIN rail or included mounting bracket		
Certifications	 		



D10 Expert™ with Numeric Display—Analog/Discrete Specifications

Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 274)		
Supply Voltage and Current	4-20 mA Analog Models: 12-24 V dc (10% max. ripple) at less than 65 mA exclusive of load 0-10 V dc Analog Models: 15-24 V dc (10% max. ripple) at less than 70 mA exclusive of load		
Supply Protection Circuitry	Protected against reverse polarity and transient voltage		
Output Configuration	Two independently configurable outputs, depending on model: NPN w/analog (4-20 mA or 0-10 V) or PNP w/analog (4-20 mA or 0-10 V)		
Output Rating	Discrete Output: 150 mA, max. load OFF-state leakage current: less than 10 μ A at 24 V dc ON-state saturation voltage: NPN: < 1.5 V @ 150 mA PNP: < 2.5 V @ 150 mA	Analog Output: 4-20 mA or 0-10 V dc Load: 4-20 mA Models: 100 Ω max. impedance 0-10 V dc Models: 1 M Ω min. impedance	
Output Protection Circuitry	Protected against false pulse on power-up and continuous short-circuit		
Output Response Time	Discrete Output: Programmable, 50 microseconds, 200 microseconds, 1 millisecond, 2.5 milliseconds Analog Output: 1 millisecond		
Delay at Power-up	Less than 1 second; outputs do not conduct during this time		
Adjustments	Push-button or remote programming of (TEACH) switching threshold response time, OFF-delay, Light/Dark Operate, and display		
Indicators	Four-digit digital display plus LED indicators for active channel, push-button lockout, OFF-delay and Light/Dark Operate selection; two yellow output indicators		
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover		
Environmental Rating	IEC IP50; NEMA 1		
Connections	PVC-jacketed 2 m or 9 m 6-wire integral cable, or integral 6-pin Pico-style quick-disconnect. QD cordsets are ordered separately. See page 260.		
Operating Conditions	Temperature: -20° to +55° C Storage Temperature: -20° to +80° C Relative humidity: 90% @ 50° C		
	Number of Devices Stacked	Ambient Temperature Rating	Load Specification
	3	55° C	150 mA
	7	50° C	50 mA
10	45° C	50 mA	
Installation	35 mm DIN rail or included mounting bracket		
Certifications			


D10 Expert™ with Bargraph Display—Discrete Specifications

	Standard Sensors	Models with Bussable Power
Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 274)	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 45 mA, exclusive of load	12 to 30 V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity, over voltage and transient voltage	
Delay at Power Up	200 milliseconds max.; outputs do not conduct during this time	850 milliseconds max.; outputs do not conduct during this time
Output Configuration	Bipolar: 1 current sourcing (PNP) and 1 current sinking (NPN)	Main units: Bipolar; 1 current sourcing (PNP) and 1 current sinking (NPN) Sub-units: 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model
Output Rating	150 mA max. load @ 25° C (derate 1 mA per ° C increase) OFF-state leakage current: less than 5 µA at 30 V dc ON-state saturation voltage: NPN: less than 200 mV at 10 mA and 1 V at 150 mA load PNP: less than 1 V at 10 mA and 1.5 V at 150 mA load	100 mA max. load (derate 1 mA per ° C) OFF-state leakage current: less than 5 µA at 30 V dc ON-state saturation voltage: NPN: less than 1.5 V PNP: less than 2 V Less than 15 V supply (9 m cable): up to 4 units with 100 mA outputs up to 8 units with 50 mA outputs
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power-up	
Output Response Time	500 microseconds (normal mode) or 200 microseconds (high-speed mode)	
Repeatability	100 microseconds (normal mode) or 66 microseconds (high-speed mode)	
Adjustments	Two push buttons and remote wire <ul style="list-style-type: none"> • Expert -style configuration (Static and Dynamic TEACH, light SET, dark SET and Windows SET) • Manually Adjust (+/-) sensitivity (from buttons only) • LO/DO, OFF-Delay, and response speed configurable (from buttons or remote wire) • Push-button lockout (from remote wire only) Factory Default Settings: Light Operate, Normal Speed, No Delay	
Indicators	8-segment red bargraph* Green Status Indicators: LO, DO, High Speed (HS) and OFF-Delay Green LED: Power ON Yellow LED: Output conducting *See datasheet for detailed information	
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover	
Environmental Rating	IEC IP50, NEMA 1	
Connections	PVC-jacketed 2 m or 9 m 6-wire integral cable, or integral 6-pin Pico-style quick-disconnect. QD cordsets are ordered separately. See page 260.	Main units: PVC-jacketed 2 m or 9 m 5-wire integral cable Sub-units: PVC-jacketed 2 m or 9 m 2-wire integral cable
Operating Conditions	Temperature: -10° to +55° C Storage Temperature: -20° to +85° C	Relative humidity: 90% @ 55° C
Installation	35 mm DIN rail or included mounting bracket	
Certifications		

D10—Discrete Specifications

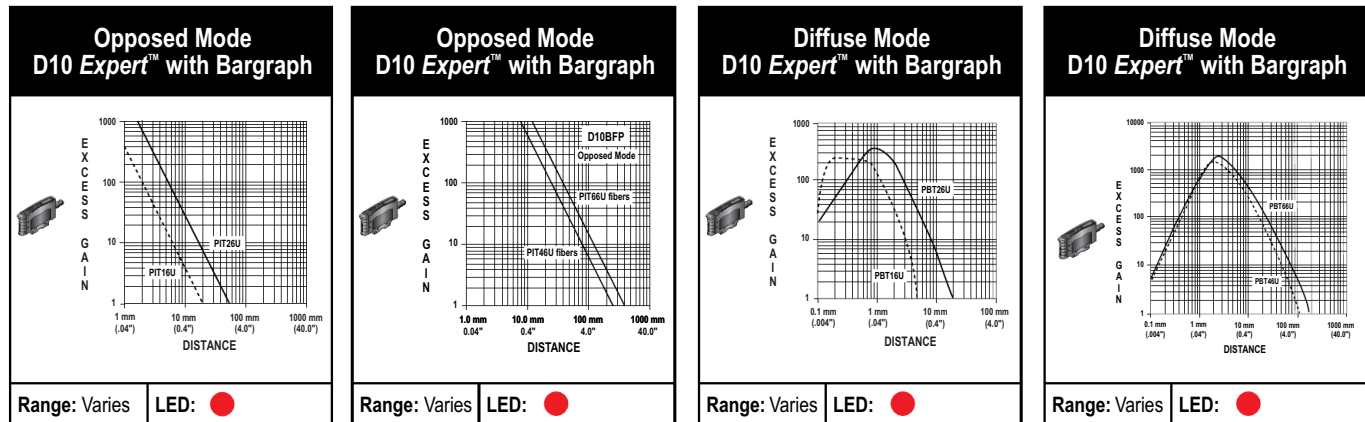
Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 274)
Supply Voltage & Current	10 to 30 V dc (10% max. ripple) @ less than 25 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltage
Output Configuration	Bipolar: 1 current sourcing (PNP) and 1 current sinking (NPN)
Output Rating	100 mA per output with short circuit protection OFF-state leakage current: less than 10 μ A sourcing; 200 μ A sinking ON-state saturation voltage: NPN: 1.6 V @ 100 mA PNP: 2.0 V @ 100 mA
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up
Delay at Power-up	Max. 100 milliseconds; outputs do not conduct during this time
Output Response Time	Standard models (with crosstalk avoidance circuitry): 500 microseconds High-speed models: 200 microseconds
Repeatability	Standard models: 95 microseconds High-speed models: 50 microseconds
Adjustments	12-turn Sensitivity potentiometer with relative position indicator; LO/DO Selection switch; 0 or 40 milliseconds OFF-delay switch NOTE: Use proper ESD techniques while making adjustments under cover
Indicators	Two LEDs: Green and Yellow Green: Power ON Yellow: Light Sensed Signal strength indicator See datasheet for detailed information
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover
Environmental Rating	IEC IP50; NEMA 1
Connections	PVC-jacketed 2 m or 9 m attached cable, or 4-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately. See page 260.
Operating Conditions	Temperature: -10° to +55° C Storage: -20° to +85° C Relative humidity: 90% @ 55° C (non-condensing)
Certifications	 

D10 Expert™ Small Object Counter—Numeric Display Specifications

Required Fiber Optics	PFCVA models (Custom fiber arrays and mounting configurations are possible. Consult factory for assistance with your small object counting application.)												
Sensing Beam	Visible red, 680 nm												
Supply Voltage and Current	12 to 24 V dc (10% maximum ripple) at less than 65 mA, exclusive of load												
Supply Protection Circuitry	Protected against reverse polarity and transient voltage												
Output Configuration	2 NPN or 2 PNP, depending on model												
Output Rating	150 mA maximum load OFF-state leakage current: < 10 µA at 24 V dc ON-state saturation voltage: NPN < 1.5 V at 150 mA load PNP < 2.5 V at 150 mA load												
Output Protection Circuitry	Protected against false pulse on power-up and continuous short-circuit												
Output Response Time	Programmable, 150 microseconds, 225 microseconds, 300 microseconds												
Delay at Power-up	Less than 1 second; outputs do not conduct during this time												
Adjustments	Push-button or remote programming of threshold offset percentage, Light/Dark Operate, Dynamic Event Stretcher (DES), display, and power/speed												
Indicators	Four-digit digital display, 2 arrow icons, push-button lockout, Dynamic Event Stretcher, Light/Dark Operate selection and 2 amber output LEDs												
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover												
Environmental Rating	NEMA 1; IEC IP50												
Connections	PVC-jacketed 2 m or 9 m 6-wire integral cable or integral 6-pin Pico-style quick-disconnect. QD cordsets are ordered separately. See page 260.												
Operating Conditions	Temperature: -20° to +55° C Storage Temperature: -20° to +80° C Relative Humidity: 90% @ 50° C (non-condensing) <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Number of Devices, Stacked</th> <th>Ambient Temperature Rating</th> <th>Load Specification</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>55° C</td> <td>150 mA</td> </tr> <tr> <td>7</td> <td>50° C</td> <td>50 mA</td> </tr> <tr> <td>10</td> <td>45° C</td> <td>50 mA</td> </tr> </tbody> </table>	Number of Devices, Stacked	Ambient Temperature Rating	Load Specification	3	55° C	150 mA	7	50° C	50 mA	10	45° C	50 mA
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3	55° C	150 mA											
7	50° C	50 mA											
10	45° C	50 mA											
Installation	35 mm DIN rail or included mounting bracket												
Certifications													

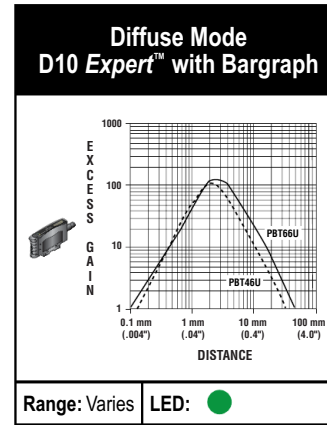
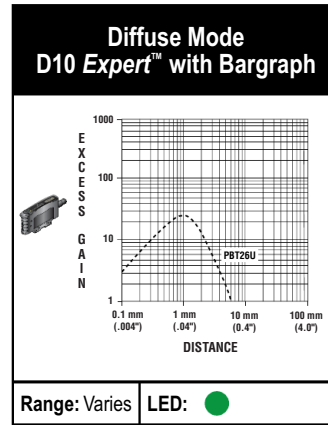
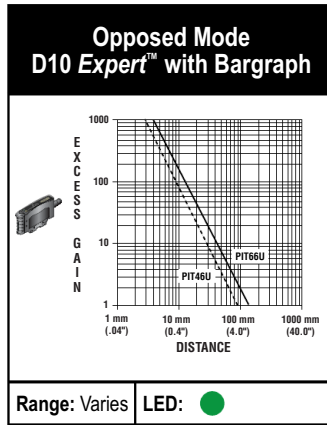
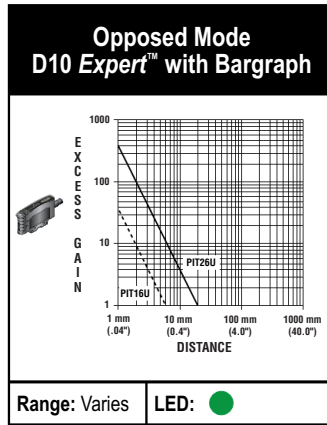
Excess Gain Curves (Diffuse-mode performance based on 90% reflectance white test card)

● = Visible Red LED ● = Visible Green LED



Excess Gain Curves (Diffuse-mode performance based on 90% reflectance white test card)

● = Visible Red LED ● = Visible Green LED



Beam Patterns (Diffuse-mode performance based on 90% reflectance white test card)

● = Visible Red LED ● = Visible Green LED

