Product Specification

Black Opal Model G12-7917 Flat Panel Display System

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Black Opal Model G12-7917 Flat Panel Display System

1 DESCRIPTION

Black Opal G12-7917 is a 12.1 ”HD 1280x800 multi-function GVA-compliant display that supports DEF STAN 00-82 video processing, in a sealed and N_2 purged chassis. The display also supports low-latency CVBS video inputs and a HD-SDI input (with a re-clocked HD-SDI output).

The G12-7917 comes fitted with an x86 Processor module and resistive touch-screen. The processor hosts user interfaces and application software, in a fan-less package. Graphics and DEF STAN 00-82 video processed by the x86 is shown on-screen mixed with low-latency CVBS/HD-SDI video.

The G12-7917’s LCD screen is protected by a robust laminated glass window, which includes a planar EMI shield. The LCD is outfitted with a high brightness LED backlight to support operation in high ambient light environments. Button backlighting can be set red or green.

Because it’s internal x86 hardware is built around modules, the G12-7917 can be upgraded through it’s working life with the new processors, more RAM and a larger SSD. With surplus USB3 and USB2 inside the chassis to support any new and legacy accessories, the G12-7917 supports future functional upgrades.

Black Opal G12-7917 display supports DEF STAN 00-82 video input. It has 28 GVA-compliant buttons that signal the x86 module via UART, as well as 5 extra buttons for backlight and power control (including a dedicated shutdown/blackout button). Black Opal Display Systems are designed to comply with MIL-STD-810G for Environmental Survival and MIL-STD-461F for Conducted and Radiated emission compliance. For Airborne applications and transportation, a pressure safety valve ensures safe operation beyond 15,000ft altitude.

The G12-7917 is part of family of GVA-compliant models. Optional features available in other models in this series include:

- Sunlight-readable backlight (1000cd/m2)
- Resistive touch screen (either externally connected via USB2 or internally connected to the x86)
- Other video inputs, such as HDMI, S-Video, RGB – all supporting low-latency video processing.
- Video outputs, such as HDMI, CVBS, RGB
- NVIS backlight
- No Pressure relief valve (fully-sealed)
- NVIS-compatible IR touch screen (no calibration or drivers required)
- Other x86 processor modules (processor family, SSD density, RAM density, etc)
- Other connector styles / sizes
- Other mounting methods

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2 SYSTEM SPECIFICATIONS

Notation - use of brackets in tables: [*notes & qualifications*] (*units*) {*alternate units*}.

2.1 System Performance

PARAMETER		SPECIFICATION
Designation		
G12-7917		Display, 12.1”, 1280x800, Internal fan-less x86.
Control		
Control Functions [factory configurable to customer requirements]		Standby; backlight intensity; source toggle; custom comms message on press and release.
Controls		33 tactile LED-backlit buttons
Display		
Type		Amorphous Silicon Active Matrix Colour (24-bit colour) LCD Module
Display Size (″) {cm}	**diagonal**	12.1” {307.3mm}
	active area	10.3” {261.12mm} x 6.4” {163.2mm}
Aspect Ratio [width:height]		16:10
Pixel Number [1 pixel is RGB trio]		1280 x 800
Colour		16.7M (24bit)
Grey Scale		256 (8bit)
Backlight Luminance [LED type;	**minimum**	0.3 minimum (and 0 for black-out)
approx.; adjustable] (cdm^{-2}) [1]	**maximum**	900 (typ)
Contrast Ratio [limiting; LCD]		500:1 min
Response Time [typ.] (ms)		25 [full cycle]
Readability [ambient conditions]		black-out to full direct sunlight [10^5 lux]
Night Vision Device compatible?		No
System Readiness		x86 boot time is application dependent; typically less than 30s

[1] 1 cdm^{-2} = 1 nit.

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PARAMETER		SPECIFICATION
Viewing Angle (°)	**vertical**	± 80 (min)
	horizontal	± 80 (min)
Video Inputs		
Inputs		Multiple DEF STAN 00-82 via Ethernet, 4 x CVBS, 1x HD-SDI
Signal Formats	**Ethernet**	DEF STAN 00-82
	CVBS	PAL/NTSC/SECAM/CCIR-601/RS170
	HD-SDI	SMPTE292-M
x86 Computer		
Processor		Fanless Intel Atom
Memory	**RAM**	4GB
	SSD	128GB
Graphics		Intel Graphics 500
OS Support		Windows or Linux
Video Outputs		
Outputs		1 x DEF STAN 00-82, 1 x HD-SDI (reclocked)
Safety & Protection		
Cooling		thermal transfer by internal and external convection;
Backfill		purged & backfilled [N_2]
Display Window		Antireflection, hard-coated, sealed, EMI/EMC shielded
Altitude/Decompression		pressure relief valve fitted for >15,000ft
Electrical Protection		conforms to Def Stan 61-5 Issue 6 Part 6
Audible Emission [@ ≥ 10m]		nil
Support		
MTBF [@30°C; 50% duty cycle] (hours)	**Airborne Rotary Winged**	tbd
	Ground Mobile	tbd
	Naval Sheltered	tbd
	Naval Unsheltered	tbd
Operational Life (years)		10

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2.2 Controls

2.2.1 Local

Control Type	Location		Primary Label	Primary Function
Button	upper left corner	left	⏻	switch between Power on/off, Standby
	lower right corner	right	○	blackout mode
	upper right corner	right	**SRC**	cycle through all available video inputs or configured layouts
	lower left corner	top	∆	backlight up
	lower left corner	bottom	∇	backlight down
	front face	left	**F1 - F6**	Reconfigurable menu buttons
	front face	right	**F7 – F12**	Reconfigurable menu buttons
	front face	bottom	**F13 – F20**	Reconfigurable menu buttons
	front face	upper	**As per DEF STAN 23-09**	Functional area selection buttons

2.2.2 Remote

Any front bezel button can be pressed, held and released through a UART from x86 Processor control. Conversely a button code is transmitted to the x86 UART when any of the front face buttons are pressed / released. An Interface Control Document is available from the factory.

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2.3 Communications

PARAMETER		SPECIFICATION
Ports		1x serial port (option), 2x USB ports, 1x GBE port
Serial	**Format**	RS-422, USB2.0, 802.3ab
	Rate (Baud)	selectable 9,600 to 115,200 (19,200 default), USB 2.0 High Speed

2.4 Physical Characteristics

PARAMETER		SPECIFICATION
Mass [approx.] (kg)		< 5
Dimensions (mm)	**Width**	368.3
	Height	268.4
	Depth	64 (not inc connectors)
Finish		Customer specified
Specific Gravity		> 1 [non-floatation]
Mounting	**Panel Mount**	4 x 5.4mm dia. clearance holes, one in each corner
	Rear Mount	4 x threaded M6 mounting holes 6mm deep, VESA 200mm x 100mm

2.5 Electrical Requirements

PARAMETER		SPECIFICATION
Supply Voltage (Vdc) [DEF STAN 61-5 Issue 6 Part 6]		9 to 32 [12 and 24 nominal]
Current Drain	**heater on**	< 5
[@ 28Vdc; maximum] (A)	**heater off**	< 2

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2.6 Environmental

PARAMETER			SPECIFICATION
Temperature (°C) [2]	**Operate**	**min.**	-40 [without wind-chill]
[MIL-STD-810F,		**max.**	+55 [without solar radiation]
Method 501.4;	**Survive**	**min.**	-40 [without wind-chill]
Method 502.4, Procedures I, II]		**max.**	+71 [without solar radiation]
Vibration and Shock [3]			MIL-STD-810G
Sealing [4]	**with pressure relief valve**		IP66
	without pressure relief valve		IP67
EMI/EMC [3,4]			MIL-STD-461F, Def Stan 59-411 Land Class A

2.7 Connector/Pin Details

No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
J1: "PWR": Power Input: D38999/24FC4PN. Mating line connector is D38999/26FC4SN					
1	DC28V_POSITIVE	**A**	Input power (+28V)	5A minimum	20..32V input (A and C are internally joined)
2	DC0V_RETURN	**B**	dc- (GND) connection	5A minimum	0V return (B and D are internally joined)
3	DC28V_POSITIVE	**C**	Input power (+28V)	5A minimum	20..32V input (A and C are internally joined)
4	DC0V_RETURN	**D**	dc- (GND) connection	5A minimum	0V return (B and D are internally joined)
J7: Earth Point: M4, 6mm deep (max)					

[2] When used in accordance with procedures in User's Manual
[3] Refer to manufacturer for details.
[4] With compliant line connectors attached, including sealing line connections.

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No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
J4: "Ethernet": Comms Connection: D38999/24FB35SA. Mating line connector is D38999/26FB35PA					
1	Do not connect	**1**	No connection	reserved	
2	BI_DD-	**2**	Data pair 4 -	Twisted pair with BI_DD+	
3	Do not connect	**3**	No connection	reserved	
4	BI_DC-	**4**	Data pair 3 -	Twisted pair with BI_DC+	
5	BI_DC+	**5**	Data pair 3 +	Twisted pair with BI_DC-	
6	Do not connect	**6**	No connection	reserved	
7	BI_DA+	**7**	Data pair 1 +	Twisted pair with BI_DA-	
8	Do not connect	**8**	No connection	reserved	
9	BI_DB+	**9**	Data pair 2 +	Twisted pair with BI_DB-	
10	BI_DB-	**10**	Data pair 2 -	Twisted pair with BI_DB+	
11	BI_DD+	**11**	Data pair 4 +	Twisted pair with BI_DD-	
12	SHIELD	**12**	Cable shield	Shield	
13	BI_DA-	**13**	Data pair 1 -	Twisted pair with BI_DA+	
J5: "USB": Dual USB2.0: D38999/24FA35SN Mating line connector is D38999/26FA35PN					
1	USB_Ground	**1**	USB Ground		
2	USB_2_D-	**2**	USB 2 Data -	Twisted pair with USB_2_D+	
3	USB_2_D+	**3**	USB 2 Data +	Twisted pair with USB_2_D-	
4	USB_1_D-	**4**	USB 1 Data -	Twisted pair with USB_1_D+	
5	USB_1_D+	**5**	USB 1 Data +	Twisted pair with USB_1_D-	
6	USB_+5V	**6**	USB VBUS		1A limited

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No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
J6: "Video In": D38999/24FB35SN Mating line connector is D38999/26FB35PN					
1	CVBS1_IN	**1**	CVBS1 input signal	Coax, 75Ω centre	
2	CVBS1_GND	**2**	CVBS1 input signal return	Coax, 75Ω shield	
3	CVBS2_IN	**1**	CVBS1 input signal	Coax, 75Ω centre	
4	CVBS3_GND	**2**	CVBS1 input signal return	Coax, 75Ω shield	
5	CVBS3_IN	**1**	CVBS1 input signal	Coax, 75Ω centre	
6	CVBS3_GND	**2**	CVBS1 input signal return	Coax, 75Ω shield	
7	CVBS4_IN	**1**	CVBS1 input signal	Coax, 75Ω centre	
8	CVBS4_GND	**2**	CVBS1 input signal return	Coax, 75Ω shield	
9	Do not connect	**9**	No connection	reserved	
10	Do not connect	**10**	No connection	reserved	
11	Do not connect	**11**	No connection	reserved	
12	Do not connect	**12**	No connection	reserved	
13	Do not connect	**13**	No connection	reserved	
J2: "HD-SDI IN": BNC					
'**J3: "HD-SDI OUT**": BNC					
J8: 'AUX' – factory use only. Do not connect.					

Note: For EMI/EMC compliance, the cables that run to *each connector* MUST have a high quality RF shield over all conductors, and this shield **must** be RF bonded to the connector shell. *This includes the power cable*.
Additionally, a small ferrite ring clamped over the outside of each cable near the connector can reduce emissions, and may be required for compliance. The need for these will be installation dependent – and will only improve the EMI profile of the system, so are strongly recommended.

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3 SET-UP

3.1 Mounts

The unit has two methods of mounting:

1. by rear 200mm x 100mm VESA pattern using 4 x threaded M6 mounting holes 6mm deep on the rear; and
2. panel mounting using 4 x 5.4mm dia. clearance holes, one in each corner.

Figure 3-1: Mounts

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3.2 Connections

The unit has five connection points located on the rear of the unit:

Connector J1, “PWR, Power connector;
Connector J2, the Earth Point connector;
Connector J3, “ETHERNET”, the Gigabit Ethernet connector;
Connector J4, “USB”, the dual USB2.0 connector;
Connector J5, “Video In”, a CVBS Input connector;
Connector J6, “HD-SDI IN”, a SDI Input connector;
Connector J7, “HD-SDI OUT”, a SDI Output connector;
Connector J8, “AUX”, a factory access connector;

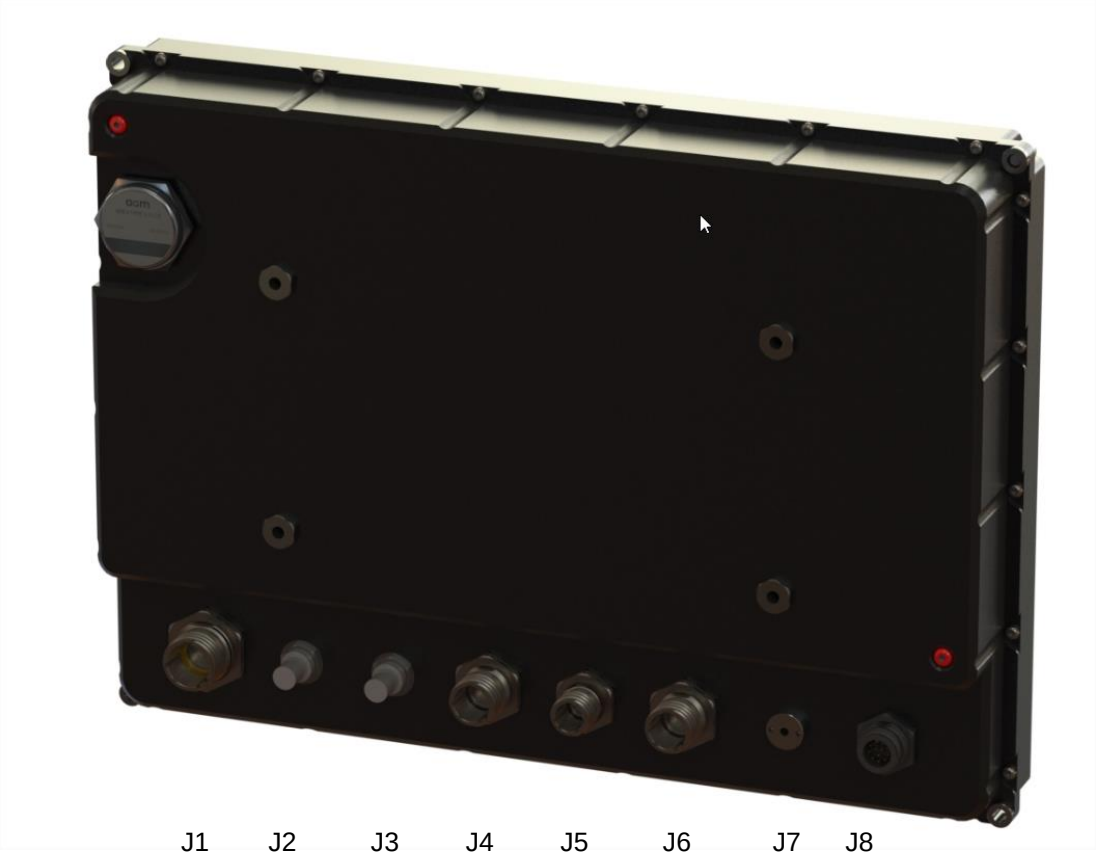

Figure 3-2: Connections

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3.3 Set-up Procedure

CAUTION: User-supplied cables must be correctly wired (see list of Connector/Pin Details).

Ensure that external power is within the range specified herein.

Ensure that external power is OFF before proceeding with set-up.

- Mount the unit to the vehicle or platform, using one of the mounting methods provided.
- Connect the earth point on the unit to an appropriate point on the vehicle.
- Connect the required video input cables to the display, and to the external imaging system(s) or recorder output.
- If required, connect the required video output cables to the display, and to the external destination.
- If required, connect the required data cable to the display, and to the communication data source.
- Connect the required power cable to the display, and to the external power source.

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3.4 Heating and Cooling

The unit contains internal heating and cooling mechanisms that are triggered at certain internal temperatures. Every heating and cooling setting can be programmed by the user, but we do not recommend deviating from the default settings. If a change is required contact the factory for instructions. The data below represents system default settings.

The approximate warm-up rate is 30s/C° (e.g. with starting internal temperature of -40°C, unit will operate after 15 minutes; with starting internal temperature of -25°C, unit will power up in approximately 7 minutes). As a safeguard, an internal timer is implemented to guarantee the display will power on and operate after 15 minutes of heater activity regardless of the actual internal temperature.

Once a unit has warmed it will operate normally provided that the ambient temperature stays within the specified operating temperature range.

The operating procedures, internal temperatures and resulting operating conditions are shown in the following table.

Ambient Temp. (°C)	Procedure	Internal Temp. (°C)	Operating Condition
< -40	do not attempt to operate unit		
-40 to 0	de-ice unit prior to start-up	≤ -10	unit will not power up; heater on
		> -10	unit will power up; heater on
0 to +55	none	≥ 10	heater off
		≥ 55	backlight power may be reduced to manage thermal load and keep unit internal temp in operating range.
+55 to +71	provide forced air cooling		
+71	do not attempt to operate unit	≥ 87	will run for >0.5hrs as per MIL-STD-810G
> 71			unit will not power up

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4 OUTLINE DRAWING

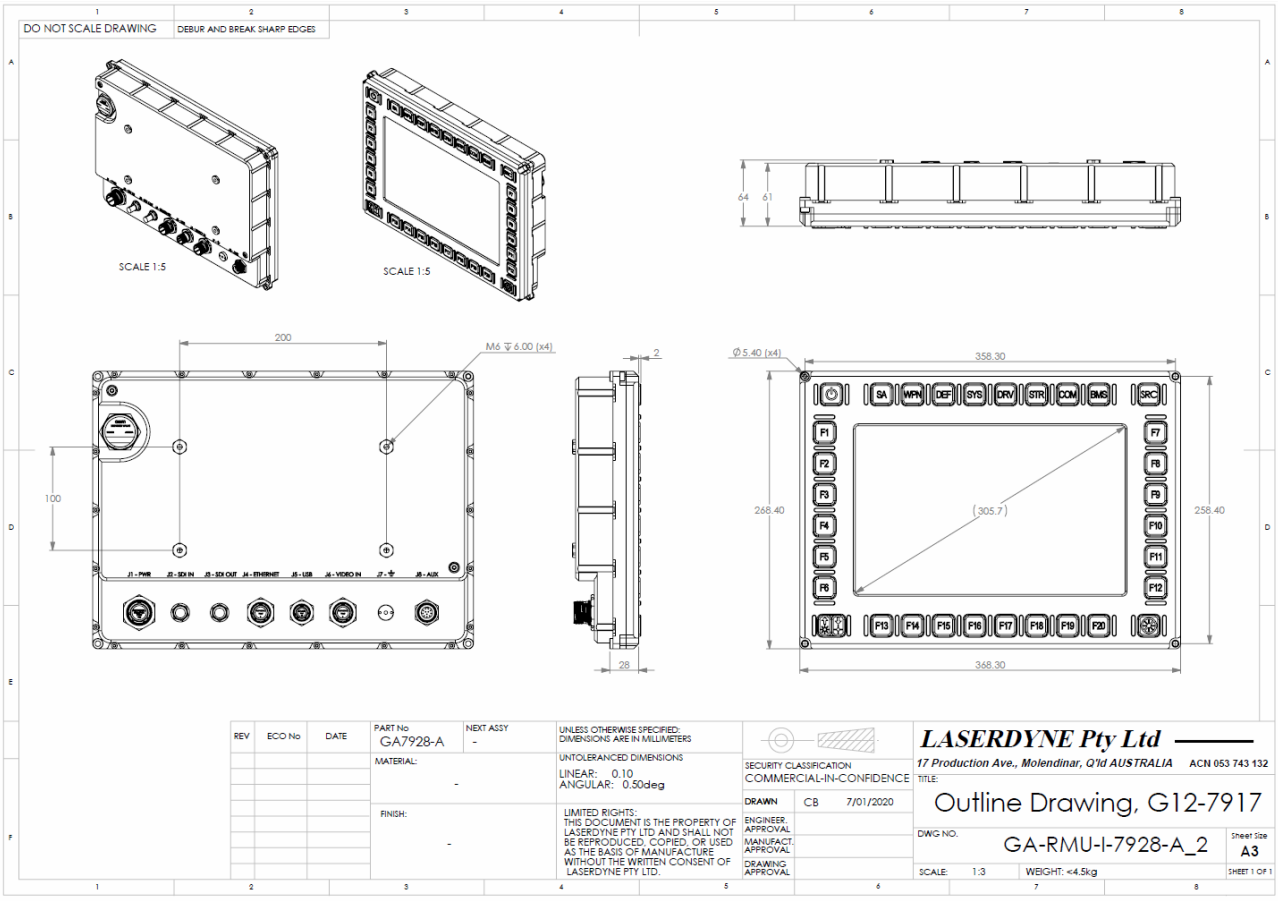

Figure 4-1: Outline Drawing

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DOCUMENT REVISION INFORMATION

Rev	Date	Details	Author
A	20 Jan 2020	Original draft release for review	MW/CB

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