



DSEControl®



# DSEM812

## PROGRAMMABLE DISPLAY FOR USE IN VEHICLES AND OFF-HIGHWAY MACHINERY



### KEY FEATURES/SUMMARY

- Robust HMI/programmable display specifically designed for mobile applications
- Optically bonded 12.1" TFT, 1280 x 800 16:10 resolution, colour
- Capacitive touch with glove support
- Two hardware variants available, one with buttons with configurable colour back light and touchscreen. One with touchscreen only (without buttons)
- iMx6 quad processor
- 16 GB flash, 2 GB RAM
- Wake-up providing fast boot functionality
- USB host connections
- 4 analogue (composite video) camera support (PAL/NTSC)
- 3 independent CAN interfaces. Each configurable as J1939, CANopen or Raw CAN
- 2 independent Ethernet interfaces, via M12 connectors (Camera support - RTP, RTSP, H264, MJPEG)
- 6 configurable outputs
- 6 inputs (digital, resistive, voltage, 0 – 20 mA, 4 – 20 mA, frequency input)
- Wi-Fi support (external antenna required)
- GPS (external antenna required)
- Flexible user programming via CODESYS 3.5 or Qt

### OVERVIEW

#### DC SUPPLY

8 V DC to 32 V DC

#### CURRENT CONSUMPTION

##### OPERATING CURRENT

< 1000 mA at 12 V and 24 V without external loads

#### DISPLAY

12.1 inch TFT, 1280 x 800 16:10 resolution  
24 bit colour  
Optically bonded

#### INPUTS/OUTPUTS (total)

6 inputs / 6 outputs

#### INPUTS

Configurable,  
Digital inputs (positive / negative)  
Analogue inputs (Voltage 0 V to 5 V, 0 V to 10 V, 0 V to 32 V, current 4 mA to 20 mA, Ratiometric, Resistive, Frequency)

#### OUTPUTS

Configurable  
Digital Output High-Sided/Low-Sided/PWM

#### INTERFACES

##### CAN 1 to 3

CAN Interfaces 2.0 A/B, ISO11898  
50 kbits/s... 1 Mbit/s  
CANopen, SAE J1939 or Raw CAN

##### ETHERNET

10 Mbit/s / 100 Mbit/s, Duplex

#### USB

USB Host 2.0 (12 Mbit/s)

#### WiFi

WiFi 2.4 GHz  
IEEE 801.11 a/b/g/n/ac

#### BLUETOOTH

Bluetooth 4.1  
Supports BR, EDR and BLE  
(Qt variant only)

#### DIMENSIONS

##### WITH BUTTONS

330 mm x 210 mm x 63.5 mm (W x H x D)  
12.99" x 8.26" x 2.5" (W x H x D)

##### WITHOUT BUTTONS

330 mm x 210 mm x 59.7 mm (W x H x D)  
12.99" x 8.26" x 2.35" (W x H x D)

#### WEIGHT

2.12 kg

#### STORAGE TEMPERATURE RANGE

-30 °C to +80 °C  
-22 °F to +176 °F

#### OPERATING TEMPERATURE RANGE

-20 °C to +70 °C  
-4 °F to +158 °F

#### PROTECTION RATING

IP67/NEMA 6 (with mating connectors)

#### MOUNTING

RAM / Panel Mount

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## Technical Data

### DSEM812

Supply		Connector B
Operating voltage	8 V DC to 32 V DC	Pin 1
Unit power supply maximum current consumption, full backlight (no external loads)	< 1000 mA at 24 V	
Unit power supply current consumption after controlled shutdown has occurred due to the ignition being turned off	< 50 mA at 24 V	
Fusing		Connector B
Unit power supply external protection fuse rating	3 A	Pin 1
High current outputs supply input external fuse protection rating (i.e. sum of output currents from all outputs provided for by an individual supply to < external fuse rating in total)	8 A or 16 A	Pin 9
Housing		
PC PBT alloy plastic resin		
Dimensions		
<b>WITH BUTTONS</b> - 330 mm x 210 mm x 63.5 mm (W x H x D) / 12.99" x 8.27" x 2.5" ( W x H x D)		
<b>WITHOUT BUTTONS</b> 330 mm x 210 mm x 59.7 mm (W x H x D) / 12.99" x 8.27" x 2.35" ( W x H x D)		
Weight		
2.12 kg		
Temperature		
Operating temperature	-20 ° C to +70 ° C / -4 ° F to +158 ° F	
Storage temperature	-30 ° C to +80 ° C / -22 ° F to +176 ° F	
Protection Rating		
IP rating	IP67 (with mating connectors)	
Display		
Resolution, pixel	1280 x 800	
Colour	24 bit	
Format	12.1" diagonal	
Touchscreen	Capacitive touch with glove support	
Mounting	Optically bonded	
Illumination	LED (lifetime > 50,000 hrs)	

## Technical Data

### DSEM812

Connectors		
Connector A - TE Connectivity AMPSEAL 3 Row 23 Way	CAT-AM78-CH8172 Part Number: 770680-1	
Connector B - TE Connectivity AMPSEAL 3 Row 23 Way	CAT-AM78-CH8172 Part Number: 770680-4	
Ethernet (2)	M12, D-coded 4 pole socket	
USB	M12, B-coded 5 pole socket	
GPS	RF – SMA Female (outside thread, female centre pin) (Suits antenna with SMA Male connector (inside thread, male centre pin))	
WiFi		
Bluetooth		
Digital Inputs		Connector B
Digital inputs configured high or low		Pin 13, 14, 17, 18, 21, 22
High level voltage threshold	Configurable, Default 6 V	
Low level voltage threshold	Configurable, Default 2 V	
Analogue Voltage Inputs		Connector B
0 V to 5 V programmable voltage range	0 V to 5 V	Pin 13, 14, 17, 18, 21, 22
0 V to 10 V programmable voltage range	0 V to 10 V	
0 V to 32 V programmable voltage range	0 V to 32 V	
Voltage measurement resolution	12 bits	
Voltage measurement accuracy	± 2% FSD	
Voltage measurement input resistance	≥30 kΩ	
Voltage measurement sampling rate	2 ms	
<i>FSD = Full Scale Deflection</i>		

## Technical Data

### DSEM812

Analogue Current Inputs		Connector B
Current measurement direction	Current sink only	13, 14, 17, 18, 21, 22
Current measurement ranges	0 mA to 20 mA	
	4 mA to 20 mA	
Current measurement resolution	12 bits	
Current measurement accuracy	± 1% FSD	
Current measurement input sink resistance	120 Ω ± 1%	
Current measurement sampling rate	2 ms	
<i>FSD = Full Scale Deflection</i>		
Analogue Resistive Inputs		Connector B
Resistance measurement range	0 Ω to 3400 Ω	13, 14, 17, 18, 21, 22
Resistance measurement source voltage	12 V maximum	
Resistance measurement current	1 mA	
Resistance measurement resolution	12 bits	
Resistance measurement accuracy	± 1% FSD	
Resistance measurement sampling rate	2 ms	
<i>FSD = Full Scale Deflection</i>		
Analogue Ratiometric Inputs		Connector B
Voltage ratiometric measurement voltage range		13, 14, 17, 18, 21, 22
Voltage ratiometric measurement Vref	Supply/Vref	
Voltage ratiometric measurement	Ratio of input pin to supply voltage	
Voltage ratiometric measurement accuracy	± 1% FSD	
<i>FSD = Full Scale Deflection</i>		
Frequency Inputs		Connector B
Frequency range	5 Hz to 30 kHz	13, 14, 17, 18, 21, 22
Resolution	100 Hz at max. freq	
Accuracy	400 Hz at max. freq	
Maximum space voltage	< 1.4 V	
Minimum mark voltage	> 2 V	
Digital Outputs High Side Only (2)		Connector B
Switching current	4 A	2, 3
Digital output active high 'ON' state internal voltage drop at rated current	< 2 V	
Digital output active high 'OFF' state leakage current	< 10 µA	
Digital Outputs Low Side / High Side Configurable (4)		Connector B
Switching current Low Side / High Side	4 A / 2 A	6, 7, 19, 20
Digital output active low 'ON' state maximum voltage at rated current	< 2 V	
Digital output active low 'OFF' state leakage current	< 2 mA	
PWM (High Side Only)		Connector B
PWM frequency	20 Hz to 250 Hz	2, 3
Duty cycle resolution	0.1 %	
Precision	0.1 % (<=250 Hz) 1 % (>250 Hz)	
Reference Voltage		Connector B
Reference voltage output	Programmable 5 V or 10 V, 100 mA accuracy ±5 %	10
		VRef GND Pin 16

## Technical Data

### DSEM812

RTC		
Real time clock	Standard RTC, powered by super cap, backup time 100 hours	Recharge time is 30 minutes.
Camera		
4 analogue composite video (PAL/NTSC) cameras	4	Connector A Pin 4, 5, 7, 8, 13, 14, 15, 23
CAN Interfaces		
Number of CAN ports	3	Connector A Pin 10, 11, 12, 17, 18, 19, 20, 21, 22
Supported protocols	J1939, CAN open, Raw CAN	
Supported programmable baud rates	50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 800 Mbit/s, 1 Mbit/s	
Ethernet Interface		M12, 4 pole
Number of Ethernet ports	2	D-coded 4 pole socket
Supported data rates	10/100 Mbit/s	
Supported protocols	Modbus TCP	
	CODESYS 3.5	
USB Interface		M12, 5 pole
Number of USB host ports	1	B-coded, 5 pole socket
Supported USB version	2	
Speeds supported	Full speed (12 Mbit/s)	
Device class supported	08 (Mass Storage)	
Supported filing system	FAT32	
Processor		
iMX6 Quad Microcontroller	ARM A9	
	1 GHz	
Memory		
Flash	16 GB (12.5 GB to CODESYS)	
RAM	2 GB	
Environmental and Testing		
CE marking	Electromagnetic compatibility (EMC) noise immunity	EN61000-6-2
	Electromagnetic compatibility (EMC) emission standard	EN61000-6-4
	Safety of information technology equipment, general requirements	BS EN 61010: 2010 +A1: 2019
E11(pending)		UN/ECE-R10.05
Water and dust	IP67 (NEMA 6)	IEC60529
Mechanical tests	Vibration & resonance search (Freq range: 10Hz to 2 kHz, Acceleration: 5 g)	EN60068-2-6
	Vibration general resonance dwell (Freq range: 5Hz to 500 Hz, Acceleration: 5 g / 10 g TBD)	EN60068-2-6
	Vibration random (Freq range: 10 Hz to 350 Hz)	EN60068-2-64
	Mechanical shock (Operational, shock pulse shape: half sine, amplitude: 50 g, duration: 11 ms, number of shocks: 3 in each direction of each axis (9 in total of each duration)	EN60068-2-27
	Mechanical shock (Amplitude: 50 g, duration: 6 ms)	EN60068-2-27
Load dump	151 V (Ri 1 Ω) 202 V (Ri 8 Ω)	ISO16750-2

## Technical Data

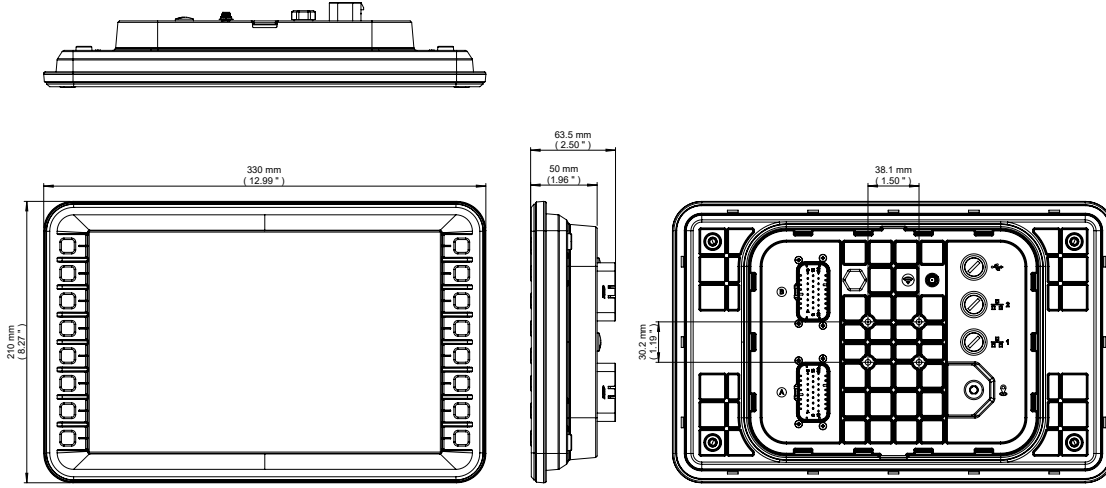
### DSE M812

<b>Additional Hardware</b>	<b>Part No</b>
M812 With Buttons Mount Kit	100-411-01
M812 Without Buttons Mount Kit	100-411-02
M812 Wiring Harness 1.2 M	016-185
M812 Connector Set (includes 8 A connector pins)	007-1073
2.4 GHz WiFi / Bluetooth Antenna	020-1080
GPS Antenna SMA (M) 3 M Cable	020-1079
Ethernet Programming Cable	016-160
M12 to USB Cable	016-161
<b>Related Materials</b>	<b>Part No</b>
M812 Operator Manual	057-317
M812 CODESYS Manual	057-318
M812 Qt Manual	057-319
<b>Product Variants</b>	<b>Part No</b>
M812 Touchscreen With Buttons - CODESYS	M812-01
M812 Touchscreen Without Buttons - CODESYS	M812-02
M812 Touchscreen With Buttons - Qt	M812-03
M812 Touchscreen Without Buttons - Qt	M812-04



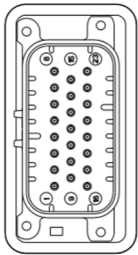
# DSEM812

## PROGRAMMABLE DISPLAY FOR USE IN VEHICLES AND OFF-HIGHWAY MACHINERY



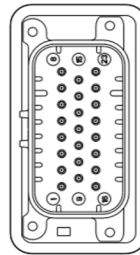
Model Shown is M812-01 / M812-03. Dimensions same for M812-02 / M812-04 except depth which is 59.7 mm / 2.35".

### Connector A



PIN	DESCRIPTION
1	Product Supply +VE/Battery
2	Wake Up
3	Ignition +VE (15)
4	Camera 1 Signal
5	Camera 1 GND
6	Program Enable
7	Camera 2 Signal
8	Camera 2 GND
9	Product Supply -VE/Battery
10	CAN1_shield/GND
11	CAN1 H
12	CAN1 L
13	Camera 3 Signal
14	Camera 3 GND
15	Camera 4 Signal
16	Product Supply -VE/Battery
17	CAN2_shield/GND
18	CAN2 H
19	CAN2 L
20	CAN3_shield/GND
21	CAN3 H
22	CAN3 L
23	Camera 4 GND

### Connector B



PIN	DESCRIPTION	
1	I/O Supply +ve	
2	Output 1	OUT H, PWM
3	Output 2	OUT H, PWM
4	GND	
5	GND	
6	Output 3	OUT H,L
7	Output 4	OUT H,L
8	GND	
9	I/O Supply +ve	
10	Vref Out +ve	
11	GND	
12	GND	
13	Input 1	AIN
14	Input 2	AIN
15	GND	
16	AGND	
17	Input 3	AIN
18	Input 4	AIN
19	Output 5	OUT H,L
20	Output 6	OUT H,L
21	Input 5	AIN
22	Input 6	AIN
23	GND	

### Ethernet

M12 'D' coded - 4 pin female



Pin - 01	TX+
Pin - 02	RC+
Pin - 03	TX-
Pin - 04	RC-

### USB Host

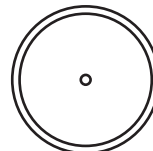
M12 'B' coded - 5 pin female



Pin - 01	+5 V DC
Pin - 02	Data -
Pin - 03	Data +
Pin - 04	0 V
Pin - 05	Shield

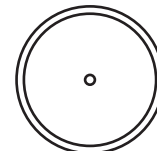
### WiFi

RF - SMA Female (outside thread, female centre pin) (Suits antenna with SMA Male connector (inside thread, male centre pin))



### GPS

RF - SMA Female (outside thread, female centre pin) (Suits antenna with SMA Male connector (inside thread, male centre pin))



### ABBREVIATIONS

- OUT PWM, H, L
- OUT H
- AIN
- A GND

Output can be configured as a PWM, PWMi, digital high-side or digital low-side  
 Output is digital high  
 Input can be configured to accept signals from positive digital, negative digital, 0 V to 10 V, 4 mA to 20 mA, ratiometric or resistive  
 Ground connection for the analogue input channels

