Murata Power Solutions

OBSOLETE PRODUCT

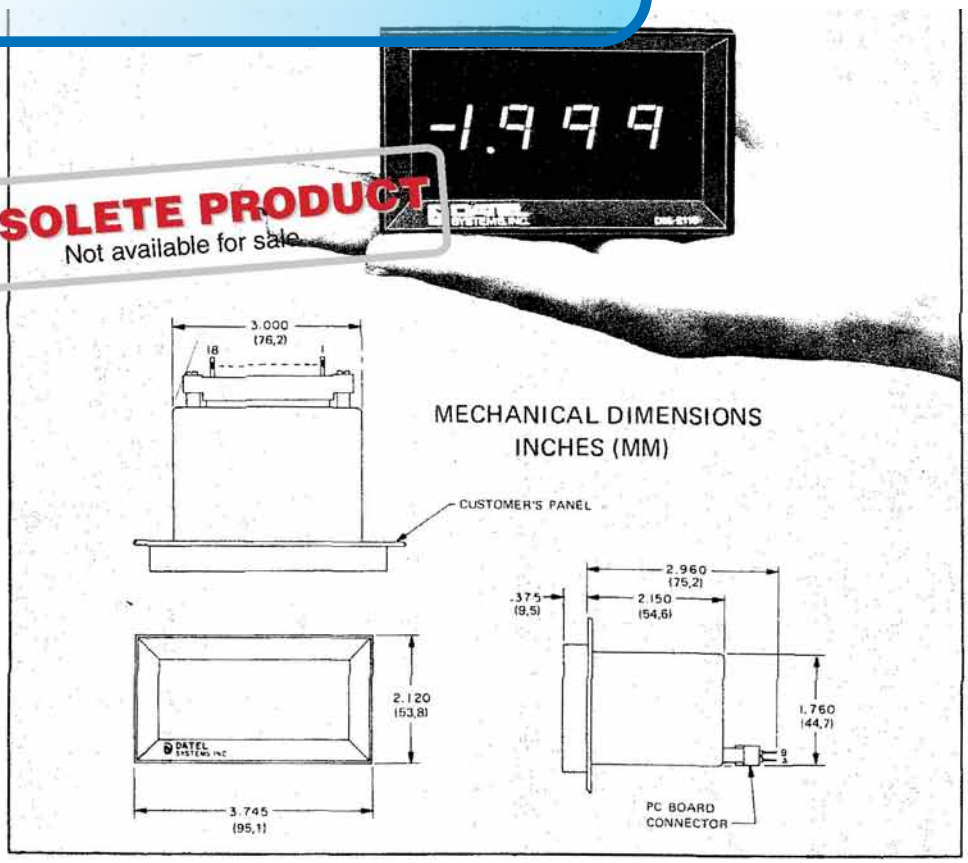
Contact Factory for Replacement Model

DM-2115

Miniature 3-1/2 Digit AC-Powered Panel Meter

FEATURES

- Choice of AC line or +5VDC power
- Compact: Only 1.75" H. x 2.25" D. x 3" W.
- Large, Bright, 0.43" High Red LED Displays
- Automatic Polarity and Overflow Display
- 5V/400mA Optional Power Input — Ideal for Portable Use
- Differential Input
- Optional Parallel BCD/TTL Output



GENERAL DESCRIPTION

Datel Systems' DM-2115 is the world's smallest AC line operated Digital Panel Meter. Packaged in a compact 1.75" H. x 2.25" D x 3" W. Polycarbonate plastic case and using large 0.43" high seven-segment LED digits, Model DM-2115 provides an easy-to-read 3½ digit display of ±1.999 volt full scale inputs complete with automatic polarity and overflow indication. Both the size and the power consumption of the DM-2115 have been significantly reduced through extensive use of MSI CMOS logic. Power input options include AC inputs of 100VAC, 115VAC or 230VAC at 47 to 440 Hz, or from +5VDC at 400mA, max. All AC supplies use a high quality C-core, strip-wound line transformer that consumes a low 3.5 watts of input power. For portable applications using the +5VDC input option, current drain can be further reduced to 120mA by blanking the display and using a press-to-read switch, or the display can be separately duty cycled.

Model DM-2115 provides true differential input characteristics with an input impedance of 100 Megohms, min., and common mode rejection of 70 dB from DC to 60 Hz. The instrument accepts a single-ended or differential input voltage range of ±1.999V and generates a display that is accurate to within ±0.05% of reading ±1 count. The temperature coefficient is 50ppm/°C, max. over the operating temperature range of 0 to +50°C. Optional models are available with full parallel, BCD TTL data outputs and auxiliary signals at the PC board I/O connector.

An internal start clock commands 4 conversions per second but an external capacitor will reduce this sampling rate. Or this internal clock can be inhibited to hold and display the last sample. An external start trigger pulse may be used to sample from 0 to 40 conversions per second.

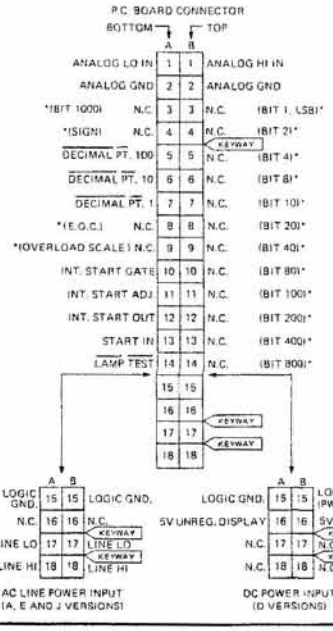
Convenience features include display test and decimal point illumination by grounding pins. In AC versions, the high isolation line transformer and the separation of analog and digital grounds provide additional protection against ground loops.

Applications for the DM-2115 include measurement and display of any variable that can be converted to a voltage. These include pH, pressure, distortion, torque, liquid level, temperature, displacement and many others.

INPUT/OUTPUT CONNECTIONS

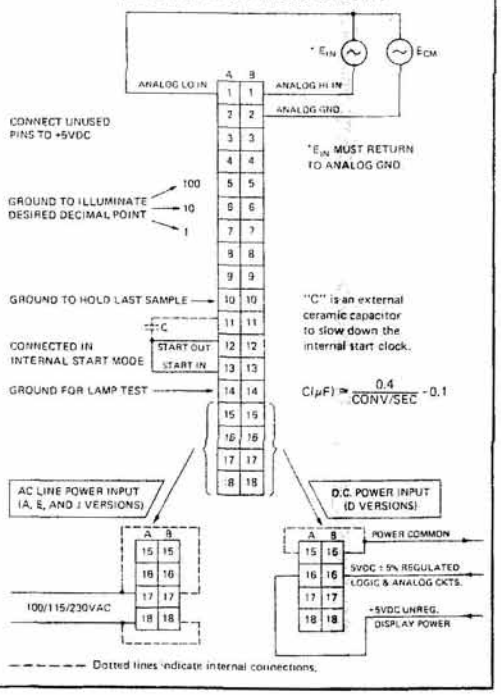
PIN FUNCTIONS

NOTE: *Parallel BCD Outputs appear at asterisked pins for BCD Models only. Models without BCD have no connections at these pins.



POWER AND SIGNAL CONNECTIONS

(Internal Start Mode Shown)



SPECIFICATIONS (Typical @ +25°C unless noted)

INPUTS

Input Voltage Range	±1.999 Volts DC
Input Impedance	100 Megohms, min.
Type of Input	True Differential
Input Bias Current	Analog HI Input 3nA Typ, 7nA Max. Analog LO Input 45nA Typ, 500nA Max.
Input Polarity	Bipolar-Automatic
Common Mode Rejection	70 dB, DC-60 Hz
Common Mode Range	(E_{IN} + E_{CM}) Must be within ±3.0V to logic or Analog Ground, ±300V to AC line
Input Overvoltage	±50V Max. continuous ±200V Max. 5 sec. duration

PERFORMANCE

Accuracy @ 25°C	±0.05% of reading ± 1 count
Resolution	1mV
Temperature Coefficient	±50ppm/°C Max.
Conversion Speed	0 to 40 conversions/sec. max. (ext. trigger required at max. rate) 4 samples/sec. normal from Int. Clock. (adjustable)
Input Settling Time	500 µs to 0.05% for full scale step. See timing diagram.
Operating Temperature Range	0 to +50°C
Storage Temperature Range	−20°C to +85°C
Warm Up Time	5 minutes to specified accuracy.
Adjustments	Diff. Amp. Balance and Full Scale located behind snap on front Bezel and filter.
Power Supply	100, 115 or 230VAC, ±10%, 47 to 440 Hz @ 3.5 Watts or +5VDC ±5%, regulated at 400mA max. total, spikes ⩽ 10 mV. LOGIC and Analog: 150mA drain (+5V) (120mA without BCD outputs) DISPLAY: (+1888), 250mA drain (+5V) max (pin A16) NOTE: Display is on separate power connection, does not require regulation and can withstand 5V ± 1V ripple.

DISPLAY OUTPUT

Display Type	Solid State 0.43" Red LED. 100% overrange.
Overload Scale	Indicated by alternating flashing of center bars and zeroes.
Decimal Points	3 left-hand decimal points selectable at rear connector. Ground appropriate pin for desired decimal point.
Polarity	Minus sign only displayed for negative input. Sign blanks for positive inputs.
DATA OUTPUTS	(Available with BCD option only) TTL/DTL compatible, all outputs buffered. LOGIC LO = "0" ⩽ +0.4V LOGIC HI = "1" ⩾ +2.4V
BCD Outputs	12 latched parallel lines 8-4-2-1 positive true binary coded decimal. Loading 2 TTL loads. BCD not valid until 400 µsec after EOC trailing edge. See timing.
Overrange (Pin A3)	Counts between 1000 and 1999 only, indicated by logic high (2TTL loads)
Overload Scale (Pin A9)	> 1999 counts indicated by logic high (2 TTL loads)
Polarity (Pin A4)	Logic high for positive inputs, logic low for negative inputs (2 TTL loads)
End of Conversion (Busy) (Pin A8)	High on leading edge of start pulse and during conversion. BCD outputs are counting while EOC is HI, and, therefore, are not valid. BCD outputs are valid 400 µSec after EOC goes LO, indicating conversion complete (2 TTL loads).

INPUT/OUTPUT CONTROL

External Start Input (Pin A13)	Positive pulse, 0 to +5V min., 1 µs min. duration CMOS input. For TTL compatibility, connect start input through 1KΩ to +5V TTL supply. Max. input +5.5V.

ALL INPUT CONTROLS ARE TTL/DTL COMPATIBLE EXCEPT EXT. START (A13) (SEE PG. 4)

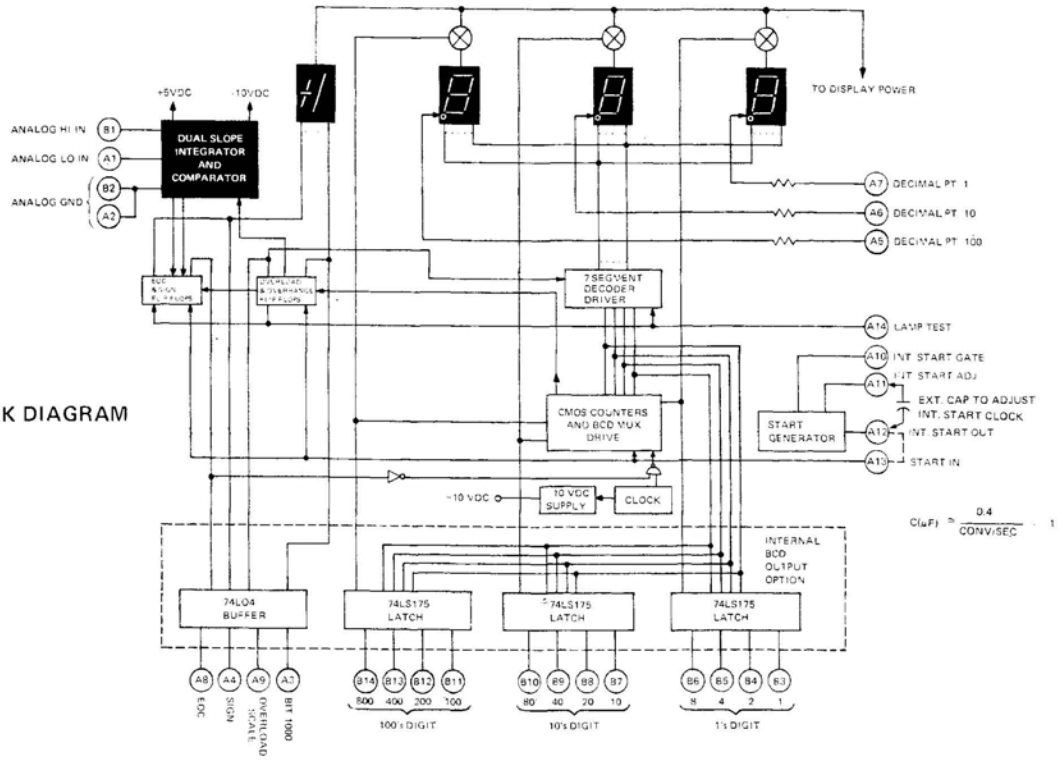
LOGIC LO = 0V ⩽ "0" ⩽ +0.8V
LOGIC HI = +2.0V ⩽ "1" ⩽ +5.0V

Internal Start Gate (Pin A10)	HIGH – RUN / LOW – HOLD } Loading, 1 TTL load.
Internal Start Adjust (Pin A11)	Controls rate of Internal Start Pulse. See pg. 1.
Internal Start Out (Pin A12)	+5V positive pulse 1 mS duration. 4 samples/sec. (adj.)
$\overline{\text{Lamp}}$ $\overline{\text{Test}}$ Input (Pin A14)	Grounding this input displays +1888 for testing all segments (4 TTL loads)
$\overline{\text{Decimal Point}}$ Inputs (Pins A5, 6, 7)	Grounding these inputs illuminates corresponding decimal points on the display. Sink 40mA, 80 µsec, 33% duty cycle
Display Power (pin A16)	250 mA max. at +5VDC

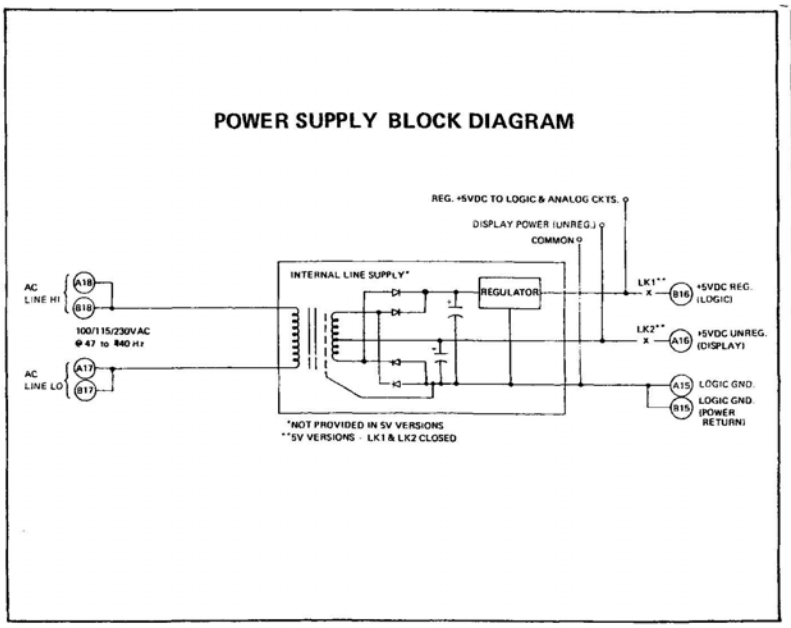
PHYSICAL

Case Size	3" W x 1.75" H x 2.25" D (76,2 mm x 44,4 mm x 57,2 mm)
Case Material	Black polycarbonate plastic
Weight	Line Power Units – 10 oz. (284g) 5V Units – 5 oz. (141g)
Mounting	1.812" x 3.062" cut out attached by four 4-40 flathead countersunk screws.
Connector	DUAL 18-pin PC edgeboard type on 0.1" centers (Viking 3VH18/1JN-5 or 1JHD-5 equiv. w/keys). See ordering guide, pg. 4.

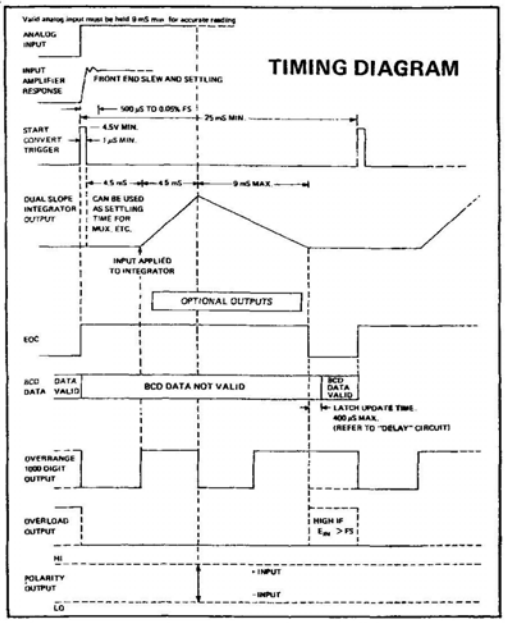
BLOCK DIAGRAM

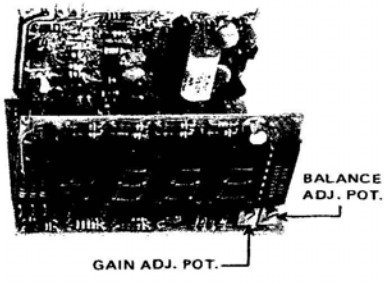


POWER SUPPLY BLOCK DIAGRAM



TIMING DIAGRAM

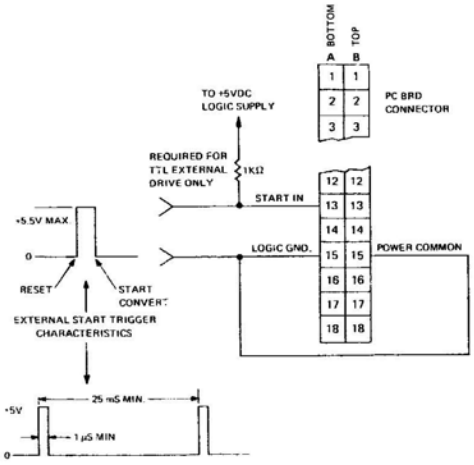




CALIBRATION PROCEDURE

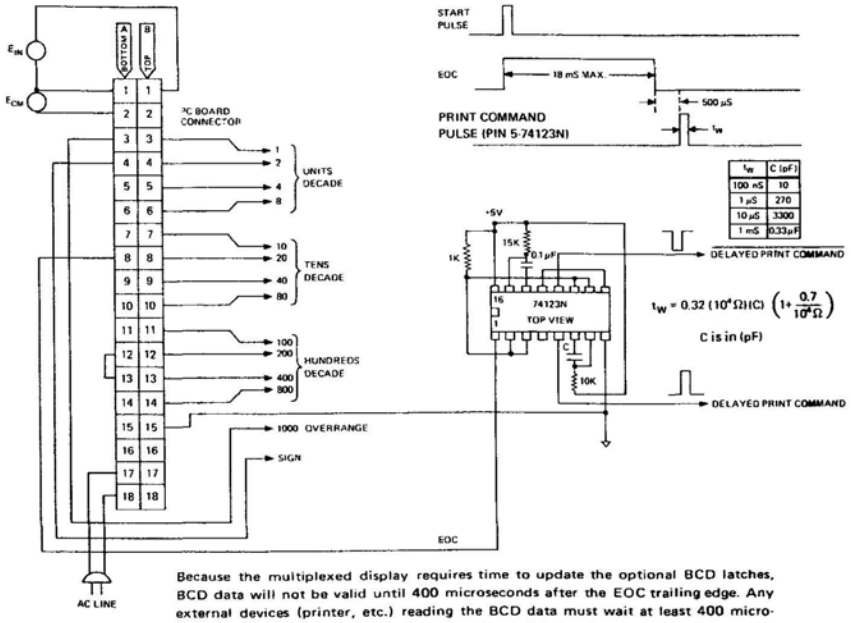
1. Remove the front bezel and filter and jumper pins A12 and A13 to initiate repetitive sampling using the internal start clock.
2. Connect both ANALOG INPUT pins to ANALOG GROUND and apply power.
3. After 5 minutes of warmup, adjust the BALANCE potentiometer so that all display digits read zero while the display polarity indicator flickers equally between blank (positive) and minus. Offset range is approximately ±15 mV.
4. On the DM-2115 under test, jumper ANALOG LO IN and ANALOG GND. Then, apply +1.9905VDC from a calibrated precision voltage reference to ANALOG HI IN, using ANALOG GND as signal input return.
5. Adjust the GAIN potentiometer of the unit under test so that the display flickers equally between +1.990 and +1.991VDC.

USING EXTERNAL START FROM TTL LOGIC



NOTE: Keep duty cycle of start trigger low to avoid display blanking and flicker.

GENERATING DELAYED PRINT COMMAND OR REGISTER STROBE USING BCD OUTPUTS



t_W	C (pF)
100 nS	10
1 µS	270
10 µS	3300
1 mS	0.33µF

$t_W = 0.32\,(10^4\Omega)(C)\left(1+\frac{0.7}{10^4\Omega}\right)$

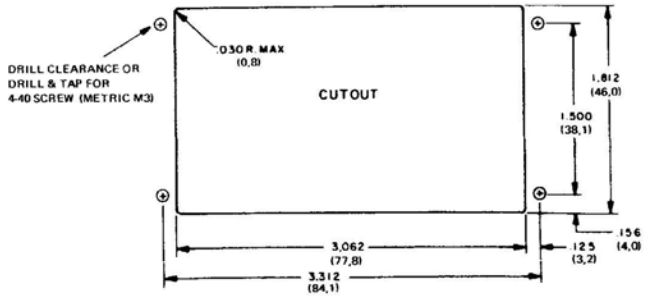
C is in (pF)

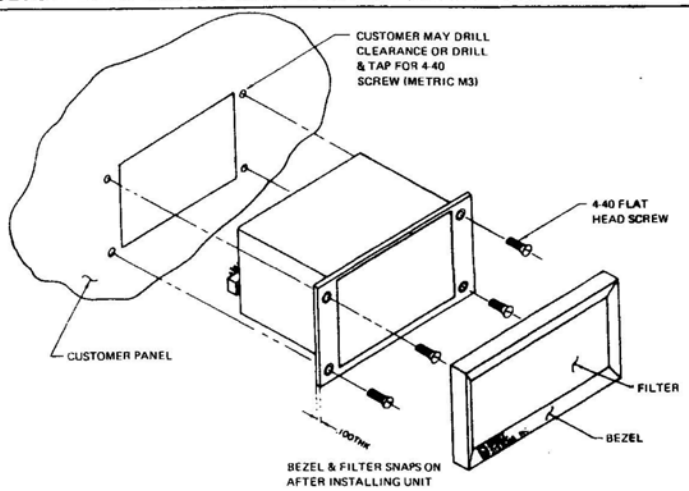
Because the multiplexed display requires time to update the optional BCD latches, BCD data will not be valid until 400 microseconds after the EOC trailing edge. Any external devices (printer, etc.) reading the BCD data must wait at least 400 microseconds. The suggested circuit shown performs this function by generating a pulse delayed 500 microseconds after the trailing edge of the EOC. The width t_W of the delayed pulse is adjustable to accommodate different output devices.

JUMPER A12/A13 FOR INTERNAL START CLOCK. LIGHT DISPLAY WITH 5V ON A16 (DC MODELS)

MOUNTING DETAILS

DIMENSIONS IN INCHES (MM)





Covered by GSA Contract No. GS-005-27959

ORDERING GUIDE

DM-2115

POWER SUPPLY
A = 115V ± 10%, 47 to 440 Hz
E = 230V ± 10%, 47 to 440 Hz
J = 100V ± 10%, 47 to 440 Hz
D = +5VDC ± 5% @ 400mA max.

FULL PARALLEL BCD OUTPUT
1 = without
2 = with

Line cord is not included

PRICES (1-9) (Contact Datel for quantity and International prices)
Prices do not include mating connectors. Please order connectors with your DPM.

+5V Powered, No BCD	DM-2115D1	$159.00
+5V Powered, w/BCD	DM-2115D2	$179.00
AC Powered, NO BCD	DM-2115A1	$199.00
	DM-2115E1	
	DM-2115J1	
AC Powered, w/BCD	DM-2115A2	$219.00
	DM-2115E2	
	DM-2115J2	

Mating connector, dual 18-pin PC board type with keys installed
2335-3 (Solder Tab, ... $4.95 ea.
Viking 3VH18/1JN-5 or equiv.)
2335-4 (Wire Wrap, ... $4.95 ea.
Viking 3VH18/1JND-5 or equiv.)

Murata Power Solutions

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