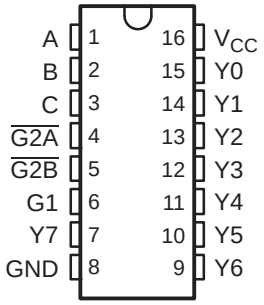
SN74LVC138A-Q1
3-LINE TO 8-LINE DECODER/DEMULTIPLEXER

SCAS708B–SEPTEMBER 2003–REVISED FEBRUARY 2008

FEATURES

- **Qualified for Automotive Applications**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Operates From 2 V to 3.6 V**
- **Inputs Accept Voltages to 5.5 V**
- **Max t_{pd} of 5.8 ns at 3.3 V**
- **Typical V_{OLP} (Output Ground Bounce) < 0.8 V at V_{CC} = 3.3 V, T_A = 25°C**
- **Typical V_{OHV} (Output V_{OH} Undershoot) > 2 V at V_{CC} = 3.3 V, T_A = 25°C**

D OR PW PACKAGE
(TOP VIEW)



DESCRIPTION/ORDERING INFORMATION

The SN74LVC138A 3-line to 8-line decoder/demultiplexer is designed for 2.7-V to 3.6-V V_{CC} operation.

The device is designed for high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, this decoder minimizes the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit, delay times of this decoder and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoder is negligible.

The conditions at the binary-select inputs and the three enable inputs select one of eight output lines. Two active-low enable inputs and one active-high enable input reduce the need for external gates or inverters when expanding. A 24-line decoder can be implemented without external inverters, and a 32-line decoder requires only one inverter. An enable input can be used as a data input for demultiplexing applications.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of this device as a translator in a mixed 3.3-V/5-V system environment.

ORDERING INFORMATION(1)

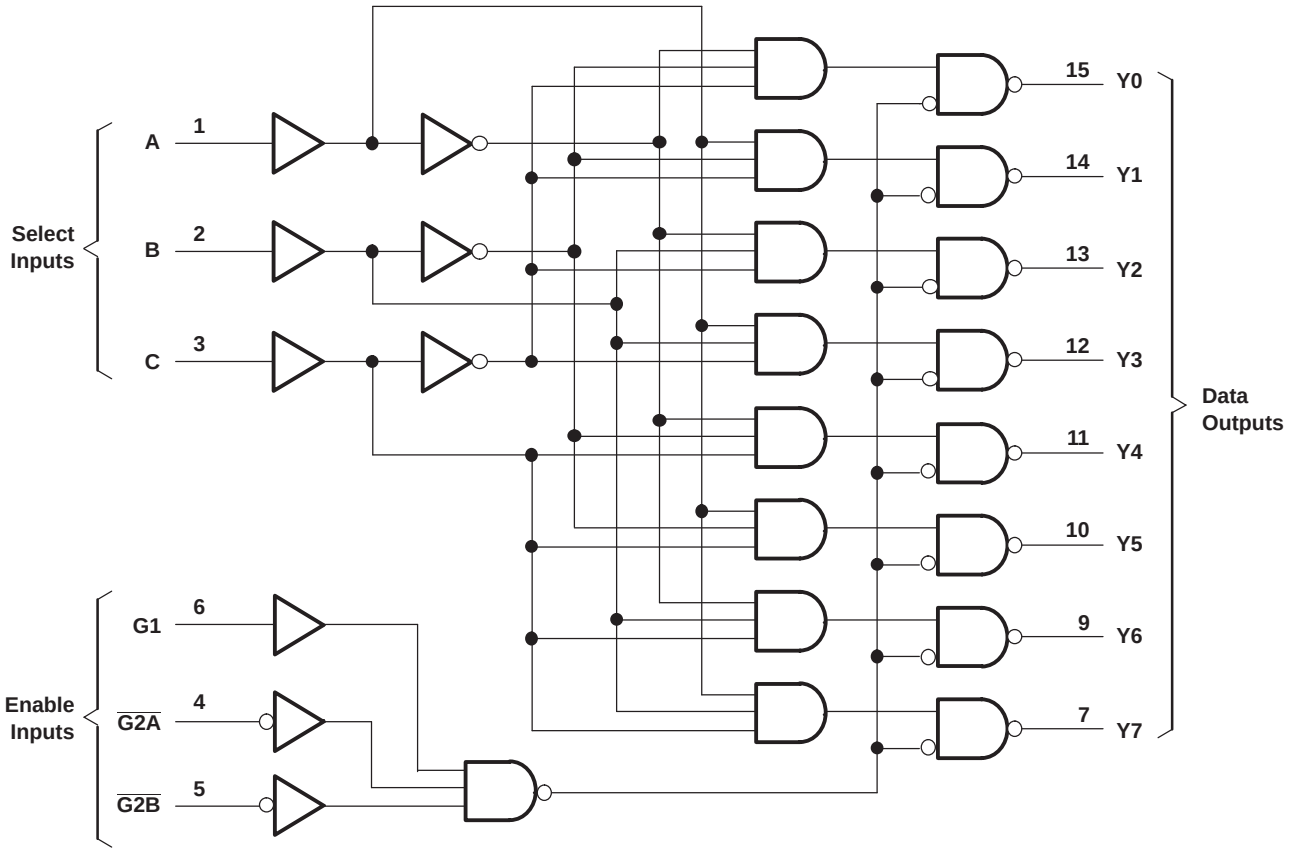
T_A	PACKAGE(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	SOIC – D	Reel of 2500	SN74LVC138AQDRQ1	L138AQ1
	TSSOP – PW	Reel of 2000	SN74LVC138AQPWRQ1	L138AQ1

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
(2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

FUNCTION TABLE

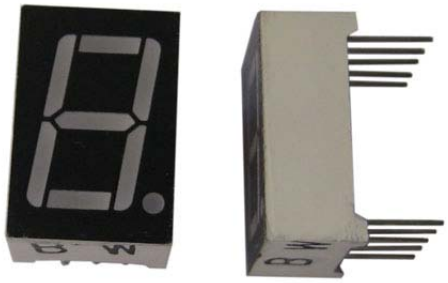
ENABLE INPUTS			SELECT INPUTS			OUTPUTS							
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

LOGIC DIAGRAM (POSITIVE LOGIC)



1.3 Common Anode 0.56 Inch (14.20mm)

PRODUCT DESCRIPTION
(1) 0.56 Inch (14.20mm) Digit Height
(2) Low current operation
(3) Excellent color and font characteristics
(4) Colors: White, blue, red, yellow and green
(5) Gray or black color background
(6) Common Anode
(7) RoHs Compliant Part



Absolute Maximum Rating (Ta = 25℃)

PARAMETER	RED	AMBER	GREEN	BLUE	WHITE	UNITS
DC Forward Current Per Segment	30	30	25	30	20	mA
Peak Current Per Segment (1)	70	50	50	25	25	mA
Avg. Forward Current (Pulse Operation) Per Segment	30	30	25	25	25	mA
Derating Linear From 25℃ Per Segment	0.3					mA/℃
Reverse Voltage (2)	3					V
Operating Temperature	-25 to +85					℃
Storage Temperature	-30 to +85					℃

(1) Pulse conditions of 1/10 duty and 0.1msec width, for long operating life, max. of 20mA recommended

(2) Reverse biasing of the dot matrix is not recommend, will cause damage to the leds

Electro-optical Characteristics (Ta = 25℃)

PART NUMBER	DICE MATERIAL (COLOR)	PEAK WAVELENGTH (nm)	MAX. REVERSE CURRENT / SEGMENT (uA)	VF (V) TYP	VF (V) MAX.	LUMINOUS INTENSITY / SEGMENT AVERAGE (IF = 10mA)
LEDS5612AUR11	AlGaAs Red	660	10	1.8	2.3	10,000 ucd
LEDS5612TB11	InGaN Blue	468	10	3.3	4.0	28,000 ucd
LEDS5612YG11	GaP Green	568	10	1.9	2.3	12,000 ucd
LEDS5612UY11	AlInGaP Amber	590	10	1.8	2.3	12,000 ucd
LEDS5612TW11	InGaN White	5,500K	10	3.3	4.0	28,000 ucd

National Semiconductor

June 1989

DM7446A, DM5447A/DM7447A BCD to 7-Segment Decoders/Drivers

General Description

The 46A and 47A feature active-low outputs designed for driving common-anode LEDs or incandescent indicators directly. All of the circuits have full ripple-blanking input/output controls and a lamp test input. Segment identification and resultant displays are shown on a following page. Display patterns for BCD input counts above nine are unique symbols to authenticate input conditions.

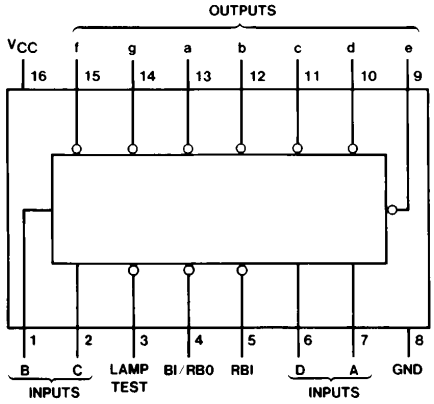
All of the circuits incorporate automatic leading and/or trailing-edge, zero-blanking control (RBI and RBO). Lamp test (LT) of these devices may be performed at any time when the BI/RBO node is at a high logic level. All types contain an overriding blanking input (BI) which can be used to control the lamp intensity (by pulsing) or to inhibit the outputs.

Features

- All circuit types feature lamp intensity modulation capability
- Open-collector outputs drive indicators directly
- Lamp-test provision
- Leading/trailing zero suppression

Connection Diagram

Dual-In-Line Package



TL/F/6518–1

Order Number DM5447AJ, DM7446AN or DM7447AN
See NS Package Number J16A or N16E

DM7446A, DM5447A/DM7447A BCD to 7-Segment Decoders/Drivers

RRD-B30M105/Printed in U. S. A.

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	
DM54	−55°C to +125°C
DM74	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Note: *The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Recommended Operating Conditions

Symbol	Parameter	DM7446A			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			V
V_{IL}	Low Level Input Voltage			0.8	V
V_{OH}	High Level Output Voltage (a thru g)			30	V
I_{OH}	High Level Output Current (BI/RBO)			−0.2	μA
I_{OL}	Low Level Output Current (a thru g)			40	mA
I_{OL}	Low Level Output Current (BI/RBO)			8	mA
T_A	Free Air Operating Temperature	0		70	°C

'46A Electrical Characteristics

over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −12 mA				−1.5	V
V_{OH}	High Level Output Voltage (BI/RBO)	V_{CC} = Min I_{OH} = Max		2.4	3.7		V
I_{CEX}	High Level Output Current (a thru g)	V_{CC} = Max, V_O = 30V V_{IL} = Max, V_{IH} = Min				250	μA
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min, V_{IL} = Max			0.3	0.4	V
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V (Except BI/RBO)				1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.4V (Except BI/RBO)				40	μA
I_{IL}	Low Level Input Current	V_{CC} = Max V_I = 0.4V	BI/RBO			−4	mA
			Others			−1.6	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (BI/RBO)				−4	mA
I_{CC}	Supply Current	V_{CC} = Max (Note 2)			60	103	mA

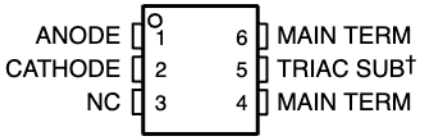
Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: I_{CC} is measured with all outputs open and all inputs at 4.5V.

SOES025 – OCTOBER 1986 – REVISED OCTOBER 1995

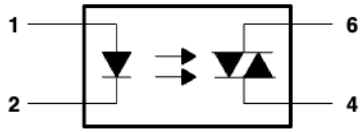
- **250 V Phototriac Driver Output**
- **Gallium-Arsenide-Diode Infrared Source and Optically-Coupled Silicon Traic Driver (Bilateral Switch)**
- **UL Recognized . . . File Number E65085**
- **High Isolation . . . 7500 V Peak**
- **Output Driver Designed for 220 V ac**
- **Standard 6-Terminal Plastic DIP**
- **Directly Interchangeable with Motorola MOC3020, MOC3021, MOC3022, and MOC3023**
- **Direct Replacements for:**
  - **TRW Optron OPI3020, OPI3021, OPI3022, and OPI3023;**
  - **General Instrument MCP3020, MCP3021, and MCP3022;**
  - **General Electric GE3020, GE3021, GE3022, and GE3023**

MOC3020 – MOC3023 . . . PACKAGE
(TOP VIEW)



† Do not connect this terminal
NC – No internal connection

logic diagram



absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)†

Input-to-output peak voltage, 5 s maximum duration, 60 Hz (see Note 1)	7.5 kV
Input diode reverse voltage	3 V
Input diode forward current, continuous	50 mA
Output repetitive peak off-state voltage	400 V
Output on-state current, total rms value (50-60 Hz, full sine wave): T_A = 25°C	100 mA
T_A = 70°C	50 mA
Output driver nonrepetitive peak on-state current (t_w = 10 ms, duty cycle = 10%, see Figure 7)	1.2 A
Continuous power dissipation at (or below) 25°C free-air temperature:	
Infrared-emitting diode (see Note 2)	100 mW
Phototriac (see Note 3)	300 mW
Total device (see Note 4)	330 mW
Operating junction temperature range, T_J	–40°C to 100°C
Storage temperature range, T_{stg}	–40°C to 150°C
Lead temperature 1,6 (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

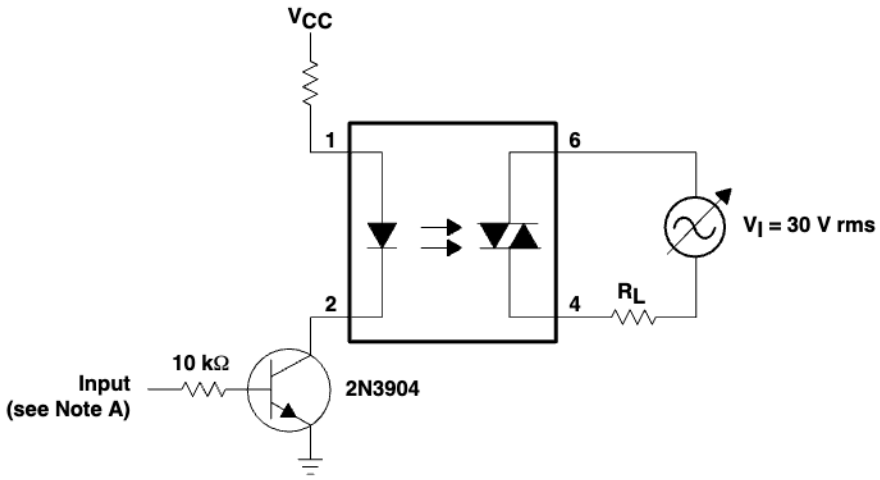
NOTES: 1. Input-to-output peak voltage is the internal device dielectric breakdown rating.
2. Derate linearly to 100°C free-air temperature at the rate of 1.33 mW/°C.
3. Derate linearly to 100°C free-air temperature at the rate of 4 mW/°C.
4. Derate linearly to 100°C free-air temperature at the rate of 4.4 mW/°C.

electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_R	Static reverse current		V_R = 3 V		0.05	100	μA
V_F	Static forward voltage		I_F = 10 mA		1.2	1.5	V
$I_{(DRM)}$	Repetitive off-state current, either direction		$V_{(DRM)}$ = 400 V, See Note 5		10	100	nA
dv/dt	Critical rate of rise of off-state voltage		See Figure 1		100		V/μs
dv/dt(c)	Critical rate of rise of commutating voltage		I_O = 15 mA, See Figure 1		0.15		V/μs
I_{FT}	Input trigger current, either direction	MOC3020	Output supply voltage = 3 V		15	30	mA
		MOC3021			8	15	
		MOC3022			5	10	
		MOC3023			3	5	
V_{TM}	Peak on-state voltage, either direction		I_{TM} = 100 mA		1.4	3	V
I_H	Holding current, either direction				100		μA

NOTE 5: Test voltage must be applied at a rate no higher than 12 V/μs.

PARAMETER MEASUREMENT INFORMATION



NOTE A. The critical rate of rise of off-state voltage, dv/dt, is measured with the input at 0 V. The frequency of V_{in} is increased until the phototriac turns on. This frequency is then used to calculate the dv/dt according to the formula:

$$dv/dt = 2\sqrt{2\pi f V_{in}}$$

The critical rate of rise of commutating voltage, dv/dt(c), is measured by applying occasional 5-V pulses to the input and increasing the frequency of V_{in} until the phototriac stays on (latches) after the input pulse has ceased. With no further input pulses, the frequency of V_{in} is then gradually decreased until the phototriac turns off. The frequency at which turn-off occurs may then be used to calculate the dv/dt(c) according to the formula shown above.

Figure 1. Critical Rate of Rise Test Circuit

TYPICAL CHARACTERISTICS

**EMITTING-DIODE TRIGGER CURRENT (NORMALIZED)
vs
FREE-AIR TEMPERATURE**

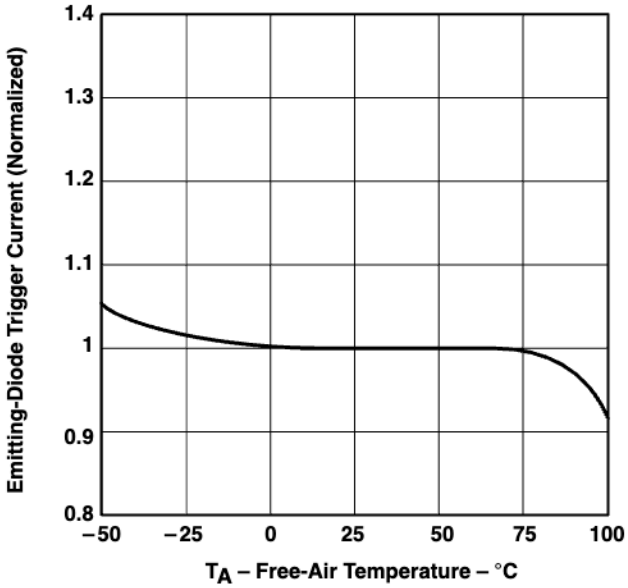


Figure 2

ON-STATE CHARACTERISTICS

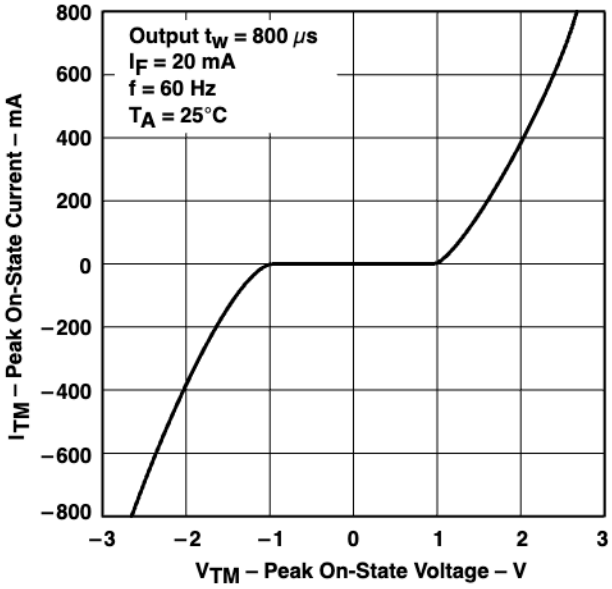


Figure 3

**NONREPETITIVE PEAK ON-STATE CURRENT
vs
PULSE DURATION**

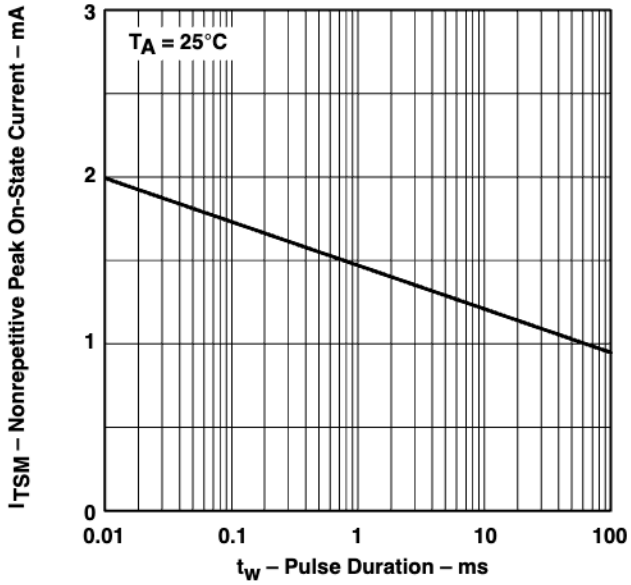


Figure 4

APPLICATIONS INFORMATION

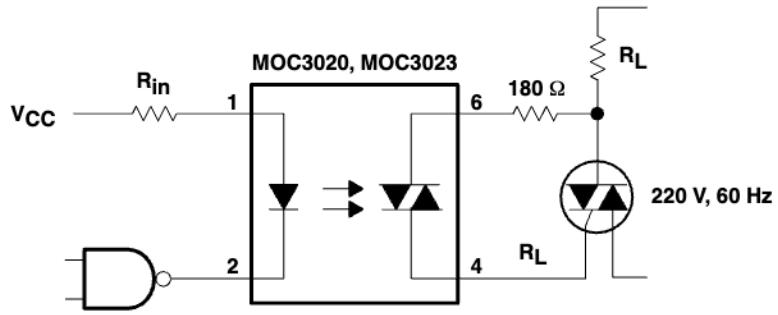


Figure 5. Resistive Load

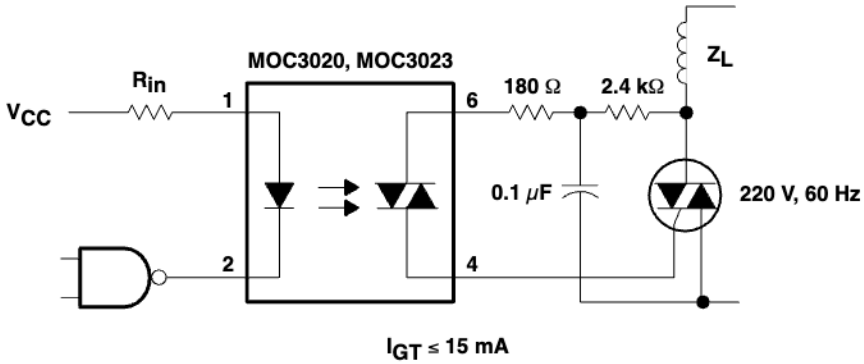


Figure 6. Inductive Load With Sensitive-Gate Triac

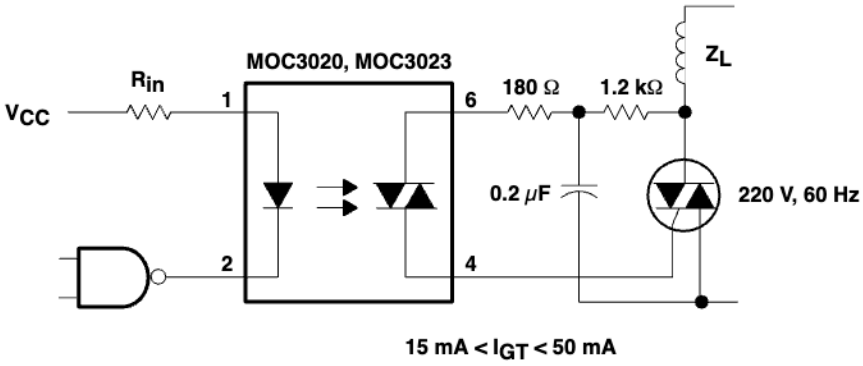


Figure 7. Inductive Load With Nonsensitive-Gate Triac

2M240 Series

ABSOLUTE MAXIMUM RATING

	Minimum	Maximum	
Filament voltage (Note 1)	2.85	3.75	V
Cathode preheating time	0	-	s
Peak anode voltage	-	4.5	kV
Average anode current	-	350	mAdc
Peak anode current	-	1.2	A
Anode input power	-	1.4	kW
Load VSWR (Note 2)	-	4	
Anode temperature (Note 3)	-	300	℃
Antenna seal temperature (Note 4)	-	320	℃
Capacitor temperature (Note 5)	-	120	℃
Storage temperature	-30	60	℃

The maximum ratings in this table which are interrelated should not be exceeded either individually or in combination under any worst case.

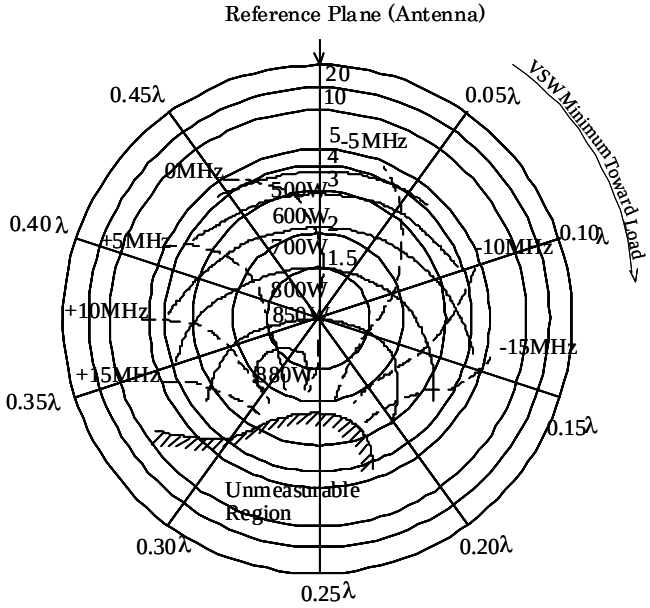
Even if the maximum ratings are not exceeded, reduced life can occur as the operating conditions approach to the maximum ratings.

TYPICAL OPERATION

Power supply : Single phase full wave rectified without filter		
Frequency	2460	MHz
Filament voltage	3.3	V
Peak anode voltage (Note 6)	4.0	kV
Average anode current	300	mAdc
Output power (matched load, Note 6)	850	W
Cooling air flow	800	?/min
Pressure drop (Approx.)	70	Pa

RIEKE DIAGRAM

Power supply : Single phase full wave rectified without filter	
Filament voltage	: 3.3 V
Average anode current	: 300 mA (constant)
Peak anode voltage (Matched load)	: 4.0 kV
Oscillating frequency (matched load)	: 2460 MHz



ABI-007-RC PIEZO INDICATOR

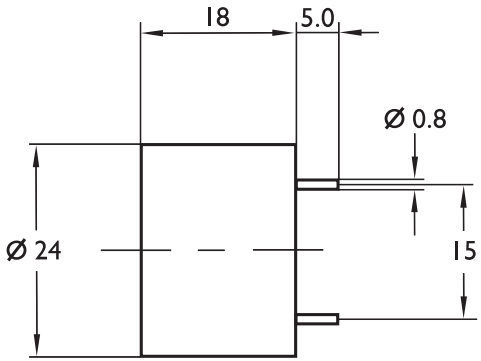
Specifications	ABI-007-RC
Rated voltage	12VDC
Operating voltage	3~16VDC
Rated current*	≤8mA
Sound output at 30cm*	≥90dB
Resonant frequency	3700±500Hz
Tone	Continuous
Operating temperature	-30~+70°C
Storage temperature	-40~+85°C
Weight	5g

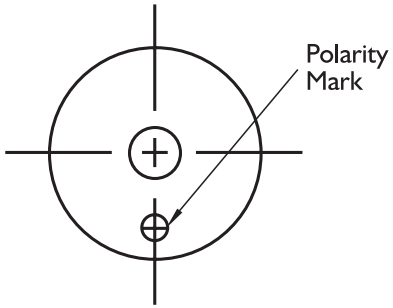
*Value applying at rated voltage (DC)

Features

- ROHS compliant
- Black in colour
- Wave solderable and washable
- Housing material: Noryl
- PCB Thro hole mounted
- Sealed base
- With internal drive circuit

All data at 25°C unless otherwise specified





Dimensions Unit: mm Tolerance: ±0.5mm

Alan Butcher Components

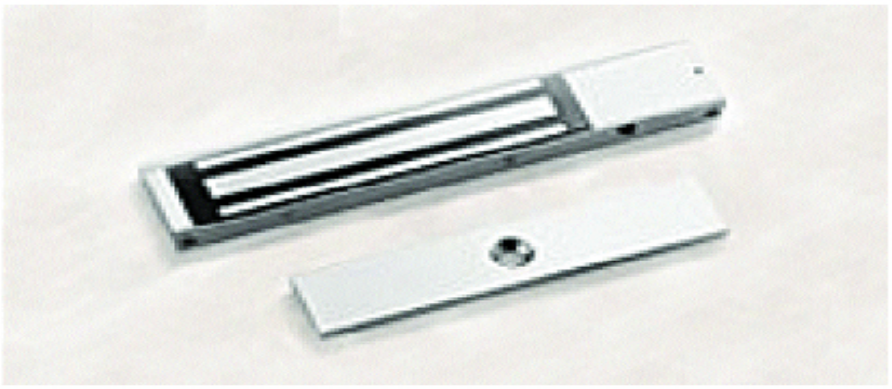
Alan Butcher Components Ltd
Unit 1 Beechwood Clump Farm Industrial Estate Tin Pot Lane Blandford Dorset DT11 7TD
Telephone 01258 456360 Email sales@abcomponents.co.uk
www.abcomponents.co.uk

LG Turntable Motor : SP ELEMECH SSM-16HR 6549W1S011N

- **Type: SSM16HR**
- **3 watts**
- **220-240 volts**
- **50/60 Hz**

Door Lock

Magnetic Locks



ML600DS

Dimensions:	L- 9.8in (250mm) W- 1.7in (42mm) D- 1.0in (26mm)
Armature Plate:	L- 7.3in (185mm) W- 1.5in (38mm) T- 0.5in (12.5mm)
Voltage:	12 / 24V DC
Current:	500mA/12V DC 250mA/24V DC
Holding Force:	600lbs. (272 kg)
Built-in Voltage Spike Suppressor	
CE Approved	
UL Approved	