M57950L

HYBRID IC FOR DRIVING TRANSISTOR MODULES

DESCRIPTION

M57950L is a Hybrid Integrated Circuit designed for driving Transistor Modules QM30DY, QM50DY, etc., in an Inverter application. This device operates as an isolation amplifier for Transistor Modules due to the electrical isolation between the input and output, and features a small outline of 10-pin SIP.

FEATURES

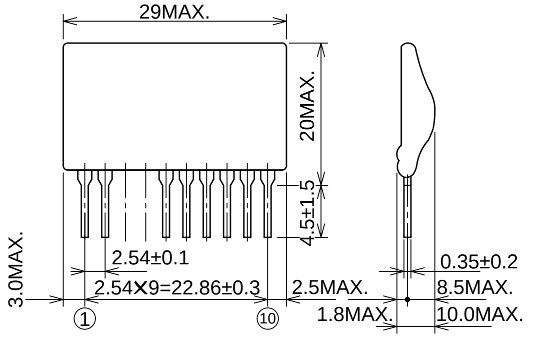
- Electrical isolation between input and output with integrated opto-coupler. V_{ISO}=2500Vrms
  Large load and sink current driving capability
  .... I_{OL}=–1A (MAX)
  .... I_{OLP}=–3A (MAX)
- Applicable with TTL input
- Small outline, 10-pin SIP package

APPLICATION

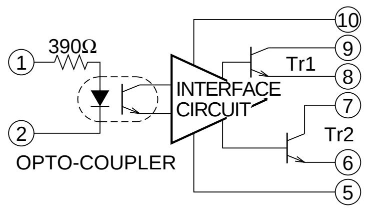
To drive Transistor Modules for Inverter applications

OUTLINE DRAWING

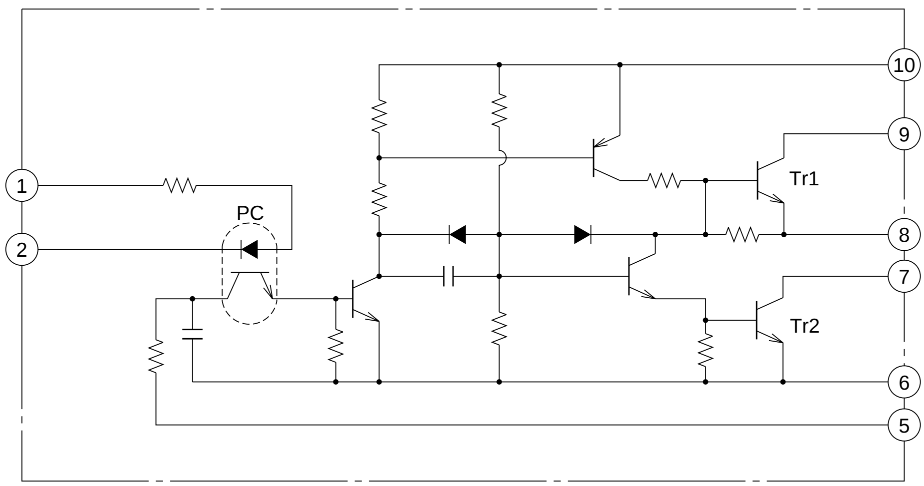
Dimensions in mm



BLOCK DIAGRAM



CIRCUIT DIAGRAM



MITSUBISHI ELECTRIC

ABSOLUTE MAXIMUM RATINGS (T_a=–20 ~ +70°C, unless otherwise noted)

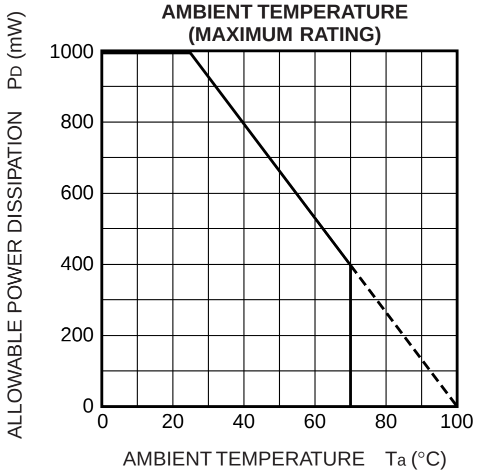
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	DC	14	V
V_{EE}	Supply voltage	DC	–5	V
V_I	Input voltage	Between terminals ① and ②	–1 ~ 7	V
I_{OH}	Output current		–1	A
I_{OLP}		Pulse width 10µs, Freq. 2kHz, peak value	3	A
V_{iso}	Isolation voltage	Sinewave voltage 60Hz/min. T_a=25°C	2500	Vrms
T_j	Junction temperature		100	°C
T_{opg}	Operating temperature		–20 ~ +70	°C
T_{stg}	Storage temperature		–25 ~ +100	°C

ELECTRICAL CHARACTERISTICS (T_a=25°C, V_{CC}=8V, unless otherwise noted)

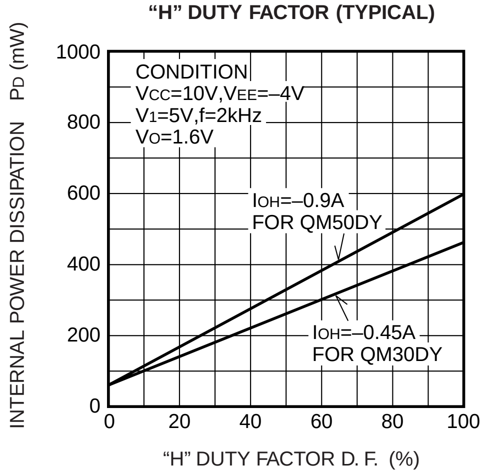
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{IH}	“H” input current	V_I=5V	–	10	–	mA
I_{OH}	“H” output current	R_{ext}=9Ω, V=1.6V	–0.8	–	–	A
I_{OLP}	“L” output peak current	C_{ext}=10µF, R_2=2Ω	–	2	–	A
P_d	Internal power dissipation	I_{OH}=–0.9A, I_{OLP}=2A, f=2kHz, D.F.=50%	–	0.33	–	W
t_{PLH}	“L-H” propagation delay time	V_I=0→4V, T_j=100°C	–	5	10	µs
t_r	“L-H” rise time	V_I=0→4V, T_j=100°C	–	–	2	µs
t_{PHL}	“H-L” propagation delay time	V_I=5→0V, T_j=100°C	–	8	15	µs
t_f	“H-L” fall time	V_I=5→0V, T_j=100°C	–	–	3	µs

PERFORMANCE CURVES

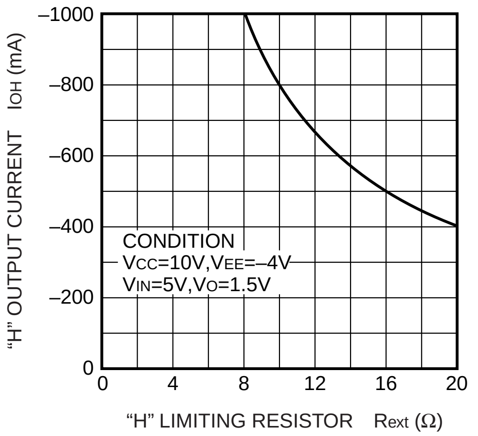
ALLOWABLE POWER DISSIPATION VS. AMBIENT TEMPERATURE (MAXIMUM RATING)



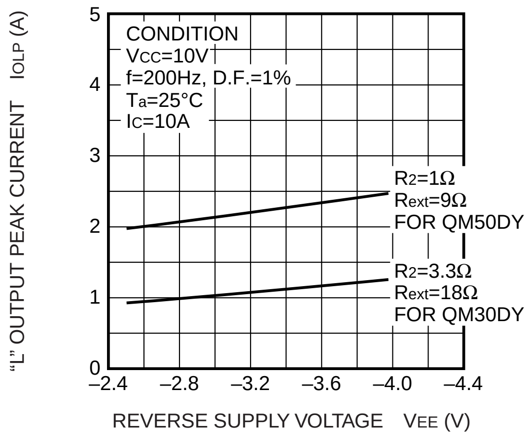
INTERNAL POWER DISSIPATION VS. "H" DUTY FACTOR (TYPICAL)



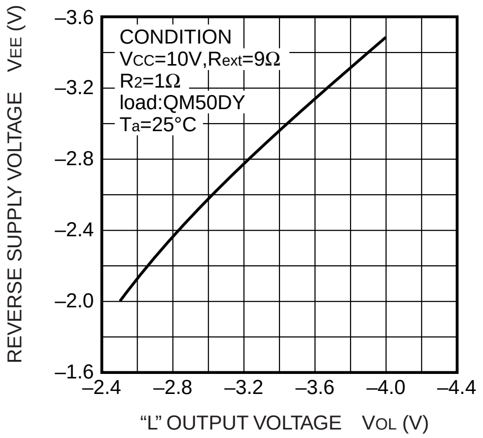
"H" OUTPUT CURRENT VS. "H" LIMITING RESISTOR (TYPICAL)



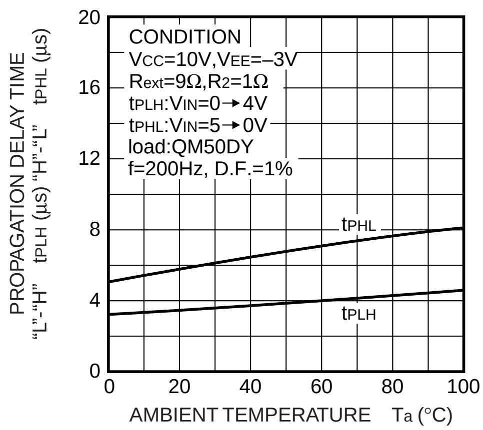
"L" OUTPUT PEAK CURRENT VS. REVERSE SUPPLY VOLTAGE (TYPICAL)



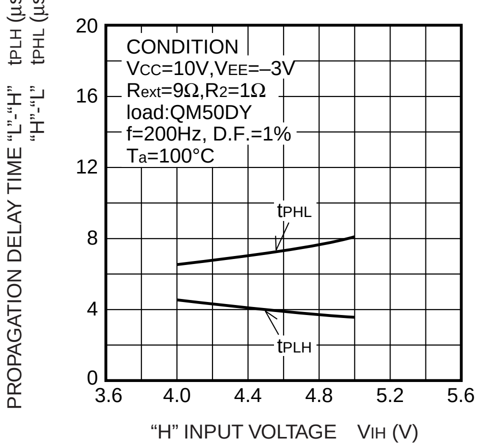
REVERSE SUPPLY VOLTAGE VS. "L" OUTPUT VOLTAGE (TYPICAL)



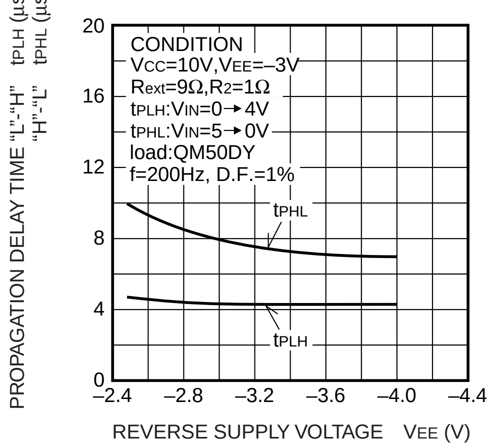
PROPAGATION DELAY TIME VS. AMBIENT TEMPERATURE (TYPICAL)



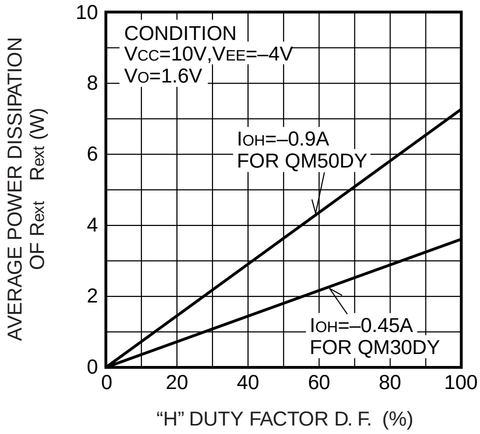
PROPAGATION DELAY TIME VS. "H" INPUT VOLTAGE (TYPICAL)



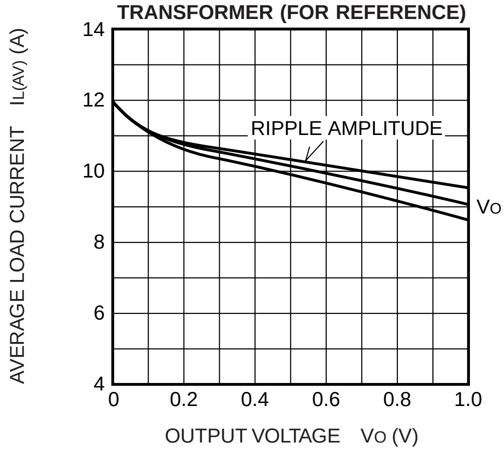
PROPAGATION DELAY TIME VS. REVERSE SUPPLY VOLTAGE (TYPICAL)

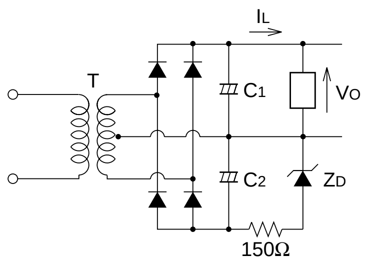


POWER DISSIPATION OF Rext VS. "H" DUTY FACTOR (TYPICAL)



OUTPUT CHARACTERISTIC OF FULL WAVE RECTIFYING CIRCUIT WITH CENTER-TAPPED TRANSFORMER (FOR REFERENCE)





T: 8V, 1A×2 CENTER-TAPPED TRANSFORMER
C_1: 4700µF, C_2: 470µF

EXPLANATION OF FUNCTION

(cf. Fig. 2, 3, 4, and 5)

(1) With low input level (V_{in}=0 ~ 1V)

Tr1 ...... OFF, Tr2 ...... ON

The base terminal of transistor module is reverse biased with respect to its emitter by reverse power supply V_{EE}.

(2) With high input level (V_{in}=4 ~ 5V)

Tr1 ...... ON, Tr2 ...... OFF

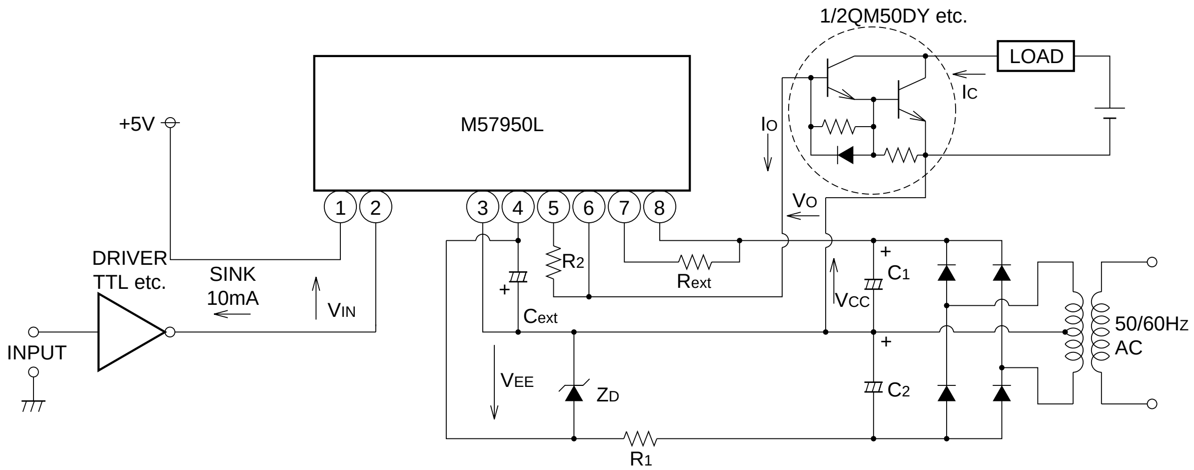
The base terminal of transistor module is forward biased and drived by the current I_{OH} through the resistor Rext.

(3) With low input level (V_{in}=0 ~ 1V)

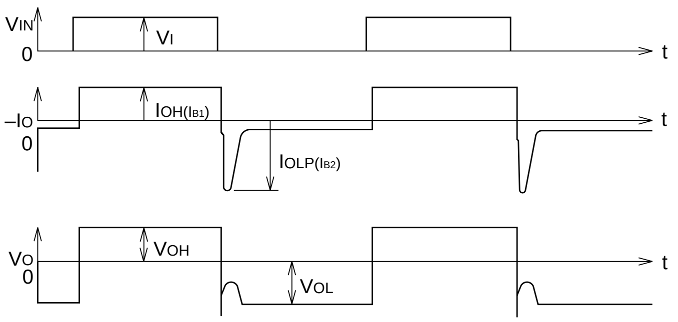
Tr1 ...... OFF, Tr2 ...... ON

The base terminal of transistor module is reverse biased as stated in (1) after flowing reverse recovery pulse current I_{OLP}. The steady reverse base current is limited by the internal base-emitter resistor R_{BE} of the transistor module.

M57950L Typical application circuit



M57950L Typical operating waveform



Note: I_{OH} and I_{OLP} correspond to base forward current I_{B1} and base reverse current I_{B2} of the transistor module to be driven respectively.