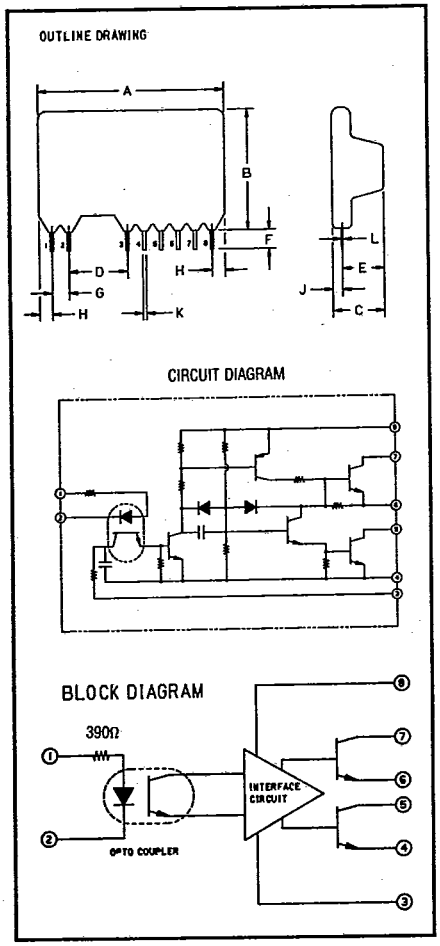
T-41-89

M57215L
M57215BL

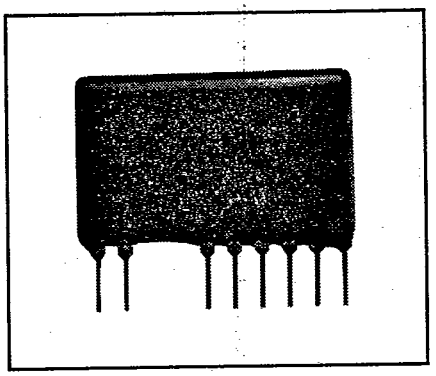
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

Hybrid IC
Base Drive Modules
2 Amperes/ –3, +10 Volts



–3, +10 Volt M57215L, M57215BL Outline Drawing

Dimension	Inches	Millimeters
A	1.142 Max.	29 Max.
B	.748 Max.	19 Max.
C	.315 Max.	8 Max.
D	.300 ± .004	7.62 ± 0.1
E	.295 Max.	7.5 Max.
F	.118 Min.	3 Min.
G	.100 ± .004	2.54 ± 0.1
H	.079 Max.	2 Max.
J	.059 Max.	1.5 Max.
K	.020 ± .004	0.5 ± 0.1
L	.010 ± .004	0.25 ± 0.1



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Description
Powerex Hybrid IC's are designed to provide logic compatible drive for transistor modules. The module includes an integral optoisolator for electrical isolation between input and output.

Features:
- ☐ Small, Lightweight
- ☐ Low Power Consumption
- ☐ TTL Logic Compatible
- ☐ Input/Output Electrically Isolated
- ☐ Single In Line Package

Applications:
- ☐ Transistor Base Drive
- ☐ Inverter Circuits

Ordering Information
Example: Select the complete seven or eight digit part number you desire from the table - i.e. M57215BL is a 2500 Volt dielectric drive module suitable for driving 1000 volt transistor modules rated at 15 to 75 Amperes.

Type	Package	Optoisolator
M57215BL	8-pin SIL	Yes
M57215L	8-pin SIL	Yes

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Maximum Ratings T_a = –20°C to 70°C unless otherwise specified

	Symbol	M57215L/M57215BL	Units
Operating Temperature Substrate	T_S	– 25 to 100	°C
Operating Temperature Ambient	T_A	– 20 to 70	°C
Supply Voltage	V_{CC}	14	Volts
	V_{EE}	– 5	Volts
Input Voltage	V_I	– 1 to 5	Volts
"H" Output Current	I_{OH}	1	Amperes
"L" Output Peak Current*	I_{OLP}	– 3	Amperes
V Isolation	V_{RMS}	2000/2500	Volts

*Pulse Width 10μs, f=2kHz

Electrical Characteristics T_a =25°C, V_{CC} =10V, V_{EE} = –3V unless otherwise specified

Characteristics	Symbol	Test Conditions	M57215L/M57215BL Min.	Typ.	Max.	Units
"H" Input Current	I_{IH}	V_I =5V	—	10	—	mA
"H" Output Current	I_{OH}	V_O =1.6V, R_{ext} =9Ω	—	0.9	—	A
"L" Output Peak Current	I_{OLP}	R_2 =1Ω, C_{ext} =10μf	—	–2	—	A
"L" - "H" Propagation Delay	t_{PLH}	T_S =100°C, V_{in} =0→4V	—	—	10	μs
"L" - "H" Rise Time	t_r	T_S =100°C, V_{in} =0→4V	—	—	1	μs
"H" - "L" Propagation Delay	t_{PHL}	T_S =100°C, V_{in} =5→0V	—	—	15	μs
"H" - "L" Fall Time	t_f	T_S =100°C, V_{in} =5→0V	—	—	3	μs
Internal Power Dissipation	P_D	I_{OH} =0.9A, I_{OLP} = –2A f=2kHz, Duty=50%	—	0.33	—	W

Recommended Operating Conditions (Refer to Typical Application Circuit)

Symbol	KD7245A1, KD724502			KD224503			KD224505			KD224575			Units
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{CC}	9	10	11	9	10	11	9	10	11	9	10	11	V
V_{EE}	– 2.5	– 3	–4	– 2.5	– 3	– 4	–2.5	– 3	– 4	–2.5	– 3	– 4	V
V_{IH}	4	—	5	4	—	5	4	—	5	4	—	5	V
V_{OH}	1.4	1.6	2.1	1.4	1.6	2.1	1.4	1.6	2.1	1.4	1.6	2.1	V
V_{OL}	– 2	—	—	– 2	—	—	–2	—	—	–2	—	—	V
R_{ext}	—	27	—	—	20	—	—	12	—	—	9	—	Ω
R_1	—	150	—	—	150	—	—	150	—	—	150	—	Ω
R_2	—	3.3	—	—	2.2	—	—	1	—	—	1	—	Ω
D_Z	—	1N4372A	—	—	1N4372A	—	—	1N4372A	—	—	1N4372A	—	—
C_{ext}*	—	10	—	—	22	—	—	22	—	—	47	—	μF
C_1	—	2200	—	—	3300	—	—	4700	—	—	4700	—	μF
C_2	—	470	—	—	470	—	—	470	—	—	470	—	μF
f	—	2	—	—	2	—	—	2	—	—	2	—	kHz

NOTES 1. When using KD___1K___, use M57215BL and set at the above conditions.

2. When using transistor modules at 100A and above, (i.e. KD324510, KD324515, KS324520 etc.), also use Drive Module KS031K01.

* The equivalent series resistance ESR of this capacitor decreases the sink current I_{OLP}, especially at low temperature. A low ESR capacitor is recommended for C_{ext}.

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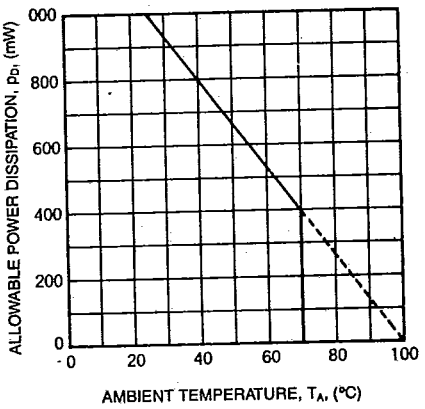
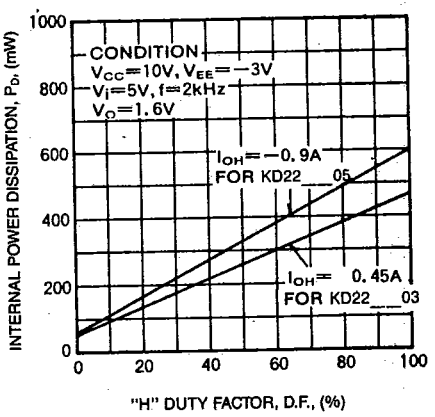
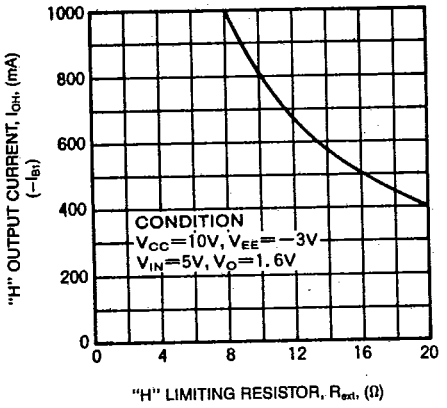
ALLOWABLE POWER DISSIPATION VS. T_A MAXIMUM RATING



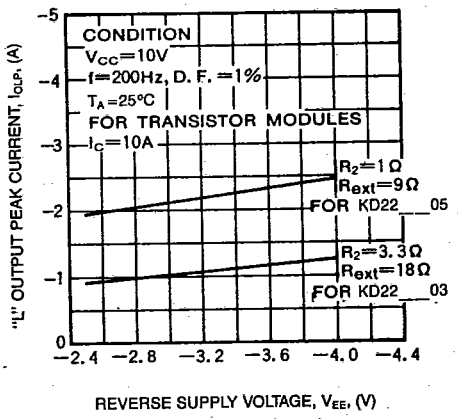
INTERNAL POWER DISSIPATION VS. DUTY FACTOR (TYPICAL)



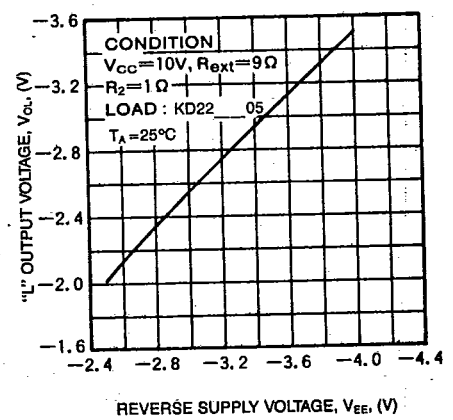
I_{OH} VS. R_{ext} (TYPICAL)



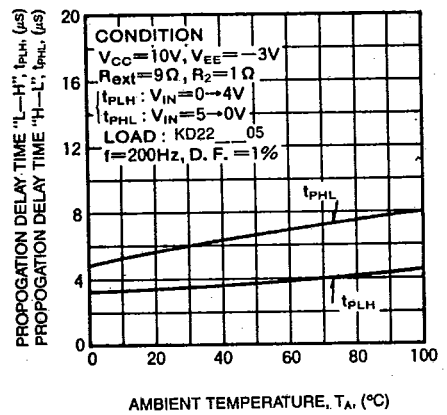
I_{OLP} VS. V_{EE} (TYPICAL)



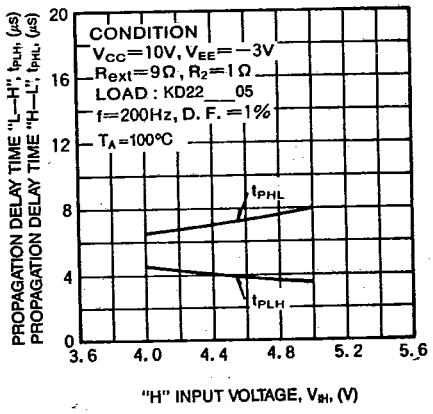
V_{OL} VS. V_{EE} (TYPICAL)



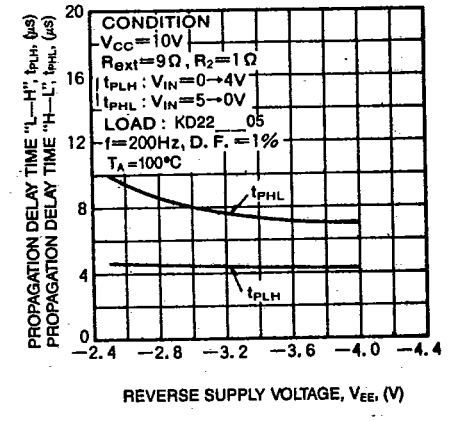
t_{PLH}, t_{PHL} VS. T_A (TYPICAL)



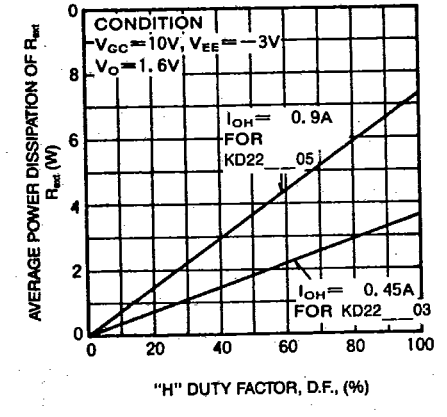
t_{PLH}, t_{PHL} VS. V_{IH} (TYPICAL)



t_{PLH}, t_{PHL} VS. V_{EE} (TYPICAL)



POWER DISSIPATION OF R_{ext} VS. DUTY FACTOR (TYPICAL)



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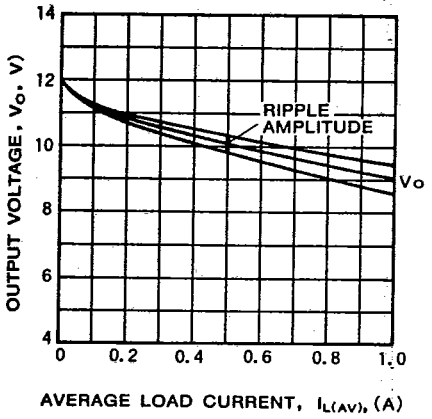
OUTPUT CHARACTERISTIC OF FULL WAVE RECTIFYING CIRCUIT WITH CENTER-TAPPED TRANSFORMER (FOR REFERENCE)



Explanation of Function

1. With low input level, (V_{in} = 0 ~ 1V)
   Tr1..OFF, Tr2...ON
   The base terminal of the 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 the transistor module is forward biased and driven by the current I_{OH} through the resistor R_{ext}.

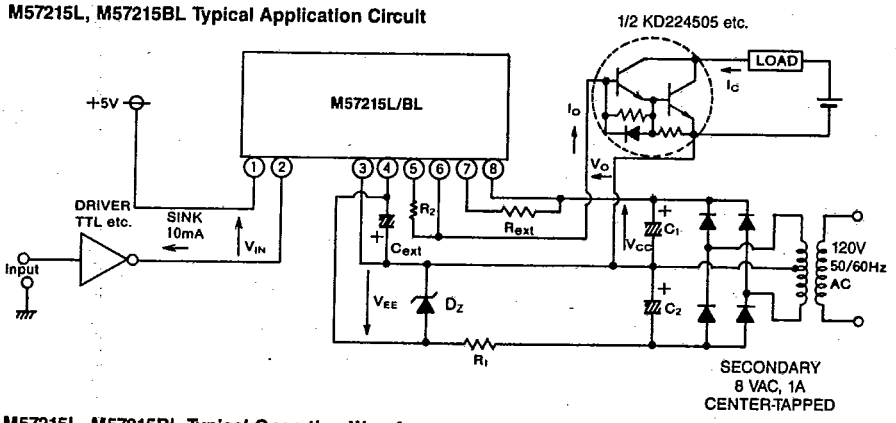
3. With low input level, (V_{in} = 0 ~ 1V)
   Tr1...OFF, Tr2...On
   The base terminal of transistor module is reverse biased as stated in (1) after conducting reverse recovery pulse current I_{OLP}. The steady reverse base current is limited by the internal base-emitter resistor R_{BE} of the transistor module.

Advice on PCB Pattern Layout

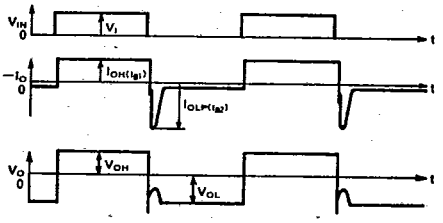
1. The auxillary resistor R_{ext} and R_1 dissipate a large amount of power. Care should be taken not to heat M57215L, M57215BL by radiant heat from these hot devices.

2. The capacitor C_{ext} should be arranged close to pin 3 and pin 4 to avoid false operation, which may be induced by abrupt change of the load impedance.

M57215L, M57215BL Typical Application Circuit



M57215L, M57215BL 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.