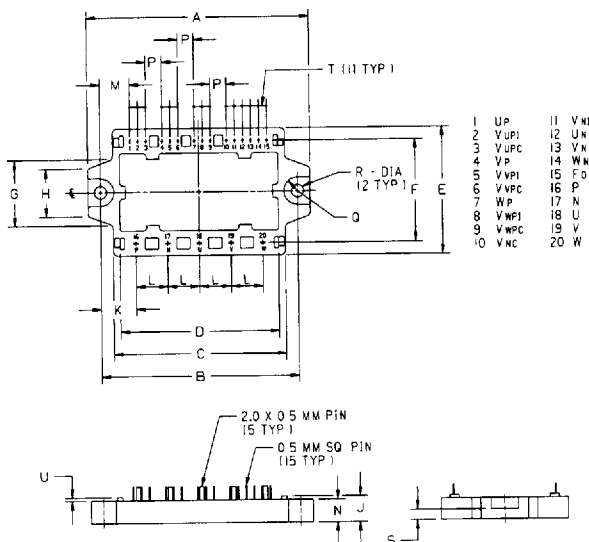


Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

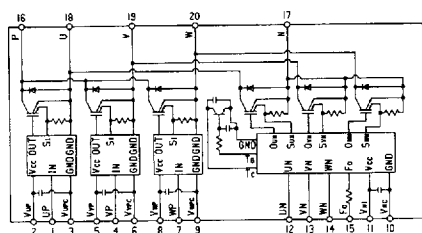
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

Intellimod™-3 Modules**Three Phase****IGBT Inverter Output****15 Amperes/110-230 Volt Line**

OUTLINE DRAWING

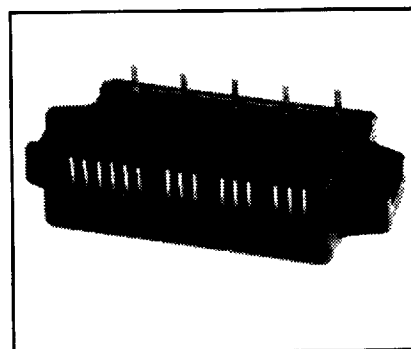


CONNECTION DIAGRAM

**110-230 Volt Line, PM15CHA060 Outline Drawing**

Dimensions	Inches	Millimeters
A	3.86±0.04	98.0±1.0
B	3.42±0.02	87.0±0.5
C	2.99	76.0
D	2.76	70.0
E	2.20±0.04	56.0±1.0
F	1.77	45.0
G	1.14	29.0
H	0.83	21.0
J	0.63	16.0
K	0.61	15.5

Dimensions	Inches	Millimeters
L	0.55	14.0
M	0.521	13.24
N	0.39	10.0
P	0.28	7.12
Q	0.24R	6.0R
R	0.22 Dia.	5.5 Dia
S	0.20	5.0
T	0.14	3.56
U	0.06	1.5V

**Description**

Powerex Intellimod-3 Modules are designed for applications requiring a high frequency (20kHz) output switching inverter. The modules are isolated from the baseplate, consisting of complete drive, control and protection circuitry for the IGBT inverter.

Features:

- ☐ Complete Output Power Circuit
- ☐ Gate Drive Circuit
- ☐ Protection Logic
 - Short Circuit
 - Over-Current
 - Over Temperature
 - Under Voltage

Applications:

- ☐ Inverters
- ☐ Small UPS
- ☐ Motion/Servo Control
- ☐ AC Motor Control

Ordering Information
PM15CHA060



POWEREX INC

51E D ■ 7294621 0005651 706 ■ PRX

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

Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

PM15CHA060

Intellimod-3 Modules

Three Phase IGBT Inverter Output

15 Amperes/110-230 Volt Line

T-57-29

Absolute Maximum Ratings, $T_J = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	PM15CHA060	Units
Power Device Junction Temperature	T_J	-20 to +150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-40 to +125	$^\circ\text{C}$
Case Operating Temperature	T_C	-20 to +100	$^\circ\text{C}$
Mounting Torque, M5 Mounting Screws	—	17	Kg-cm
Module Weight (Typical)	—	90	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 - 16.5\text{ V}$, Inverter Part)	$V_{CC(\text{prot.})}$	400	Volts
Isolation Voltage AC 1 minute, 60Hz	V_{RMS}	2500	Volts

Control Sector

Supply Voltage Applied Between ($V_{UP1} - V_{UPC}$, $V_{VP1} - V_{VPC}$, $V_{WP1} - V_{WPC}$, $V_{N1} - V_{NC}$)	V_D	20	Volts
Input Current Applied Between (U_P , V_P , W_P , U_N , V_N , W_N)	I_{CIN}	20	mA
Input Voltage Applied Between (U_P , V_P , W_P , U_N , V_N , W_N)	V_{CIN}	20	Volts
Fault Output Supply Voltage	V_{FO}	20	Volts
Fault Output Current	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage Fig. 1	V_{CES}	600	Volts
Collector Current $\pm$	I_C	15	Amperes
Peak Collector Current $\pm$	I_{CP}	30	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	400	Volts
Supply Voltage (Surge) Applied between P - N	$V_{CC(\text{surge})}$	500	Volts
Collector Dissipation	P_C	43	Watts



■ POWEREX INC

51E D ■ 7294621 0005652 642 ■ PRX

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

Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

T-57-29

PM15CHA060

Intellimod-3 Modules

Three Phase IGBT Inverter Output

15 Amperes/110-230 Volt Line

Electrical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Overcurrent Trip Level Inverter Part	OC	-20°C ≤ T ≤ +125°C	18	26	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T ≤ +125°C	—	39	—	Amperes
Overcurrent Delay Time	t _{off(OC)}	V _D = 15V, Fig. 7	—	10	—	μS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
Over Temperature Protection	OT _R	Reset Level	—	90	—	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
Supply Circuit Under Voltage Protection	UV _R	Reset Level	—	12.5	—	Volts
Supply Voltage	V _D	Applied between V _{UP1} - V _{UPC} , V _{VP1} - V _{PC} , V _{WP1} - V _{WPC} , V _{N1} - V _{NC}	13.5	15	16.5	Volts
Circuit Current	I _D	V _D = 15V, I _{CIN} = 1mA, V _{N1} - V _{NC}	—	25	40	mA
	I _D	V _D = 15V, I _{CIN} = 1mA, V _{XP1} - V _{XPC}	—	7	12	mA
Input Bias On Current	I _{CIN(on)}	Sink Current at U _P , V _P , W _P , U _N , V _N , W _N	0.1	0.22	0.5	mA
Input Bias Off Current	I _{CIN(off)}	Sink current at U _P , V _P , W _P , U _N , V _N , W _N	0.1	0.22	0.5	mA
PWM Input Frequency	f _{PWM}	3-Ø Sinusoidal	—	15	20	kHz
Dead Time	t _{DEAD}	For each Input Pulse	2.0	—	—	μS
		Using example Interface Circuit*	5.0	—	—	μS
Fault Output Current	I _{FO(H)}	V _D = 15V, V _{FO} = 15V	—	—	0.01	mA
	I _{FO(L)}	V _D = 15V, V _{FO} = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t _{FO}	V _D = 15V	20	40	60	μS
		Using example Interface Circuit*	25	100	—	μS
V _D = 15V						

*See Intellimod-3 Applications Data Section 4.3



POWEREX INC

51E D ■ 7294621 0005653 589 ■ PRX

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

Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

PM15CHA060

Intellimod-3 Modules

Three Phase IGBT Inverter Output

15 Amperes/110-230 Volt Line

T-57-29

Electrical Characteristics, $T_J = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CEX}$, $T_J = 25^\circ\text{C}$, Fig. 6	—	—	1	mA
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CEX}$, $T_J = 125^\circ\text{C}$, Fig. 6	—	—	10	mA
Diode Forward Voltage	V_{FM}	$-I_C = 10\text{A}$, $V_D = 15\text{V}$, $I_{CIN} = 1\text{mA}$, Fig. 3	—	1.7	2.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}$, $I_{CIN} = 0\text{mA}$, $I_C = 10\text{A}$, Fig. 2	—	2.6	3.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}$, $I_{CIN} = 0\text{mA}$, $I_C = 10\text{A}$, $T_J = 125^\circ\text{C}$, Fig. 2	—	2.5	3.4	Volts
Inductive Load Switching Times	t_{on}	$V_D = 15\text{V}$, $I_{CIN} = 0\text{mA}$,	0.5	0.9	1.5	μS
	t_{rr}	$V_{CC} = 300\text{V}$, $I_C = 10\text{A}$,	—	0.15	0.4	μS
	$t_{C(on)}$	$T_J = 125^\circ\text{C}$,	—	0.3	1.0	μS
	t_{off}	Fig. 4, Fig. 5	—	1.5	2.5	μS
	$t_{C(off)}$		—	0.5	1.5	μS

Thermal Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistances	$R_{th(j-c)Q}$	Inverter IGBT Part	—	—	2.9	$^\circ\text{C/W}$
	$R_{th(j-c)F}$	Inverter FWD	—	—	4.5	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin, Thermal Grease Applied	—	—	0.4	$^\circ\text{C/W}$

Recommended Operating Conditions

Characteristics	Symbol	Test Conditions	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 400	Volts
	V_D	Applied between $V_{UP1} - V_{UPC}$, $V_{N1} - V_{NC}$, $V_{VP1} - V_{VPC}$, $V_{WP1} - V_{WPC}$	15 ± 1.5	Volts
Input On Current	$I_{CIN(on)}$	Applied between	0 ~ 0.5	mA
Input Off Current	$I_{CIN(off)}$	U_P , V_P , W_P , U_N , V_N , W_N	0.5 ~ 2	mA
PWM Input Frequency	f_{PWM}	Using example Interface Circuit*	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Using example Interface Circuit*	5.0	μS

*See Intellimod-3 Applications Data Section 4.3

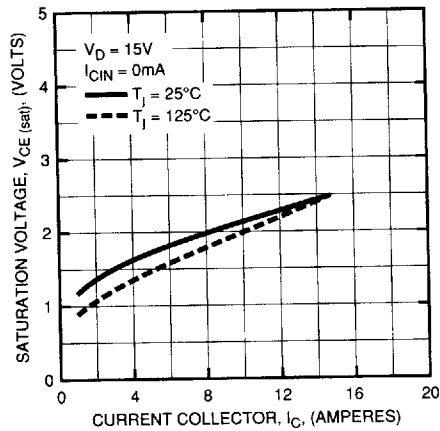
PM15CHA060

Intellimod-3 Modules

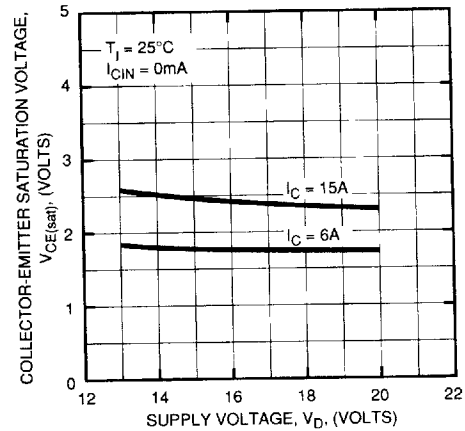
Three Phase IGBT Inverter Output

15Amperes/110-230 Volt Line

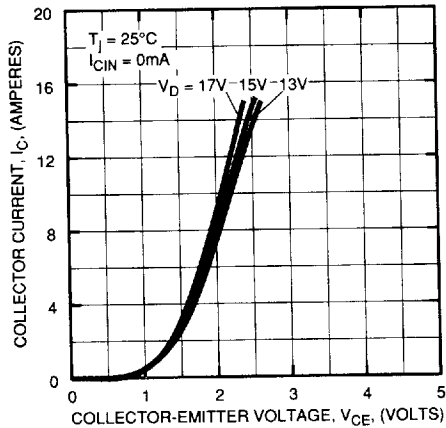
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



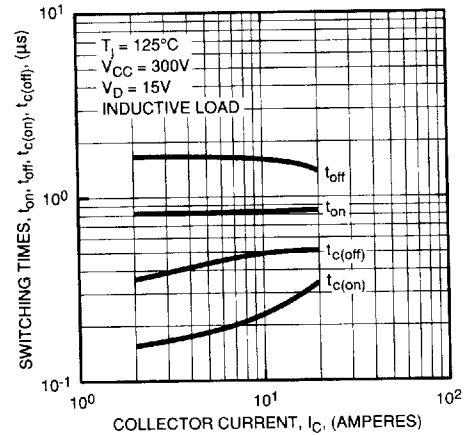
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



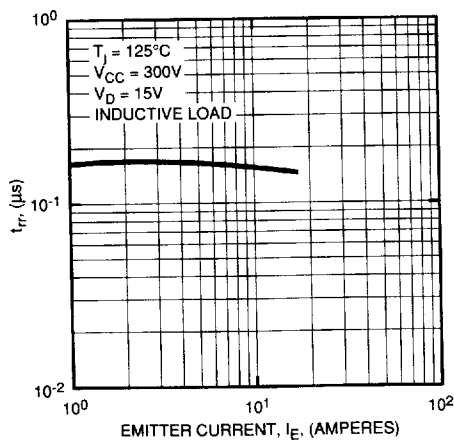
OUTPUT CHARACTERISTICS (TYPICAL)



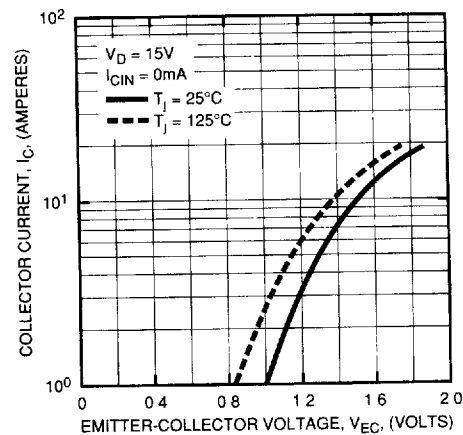
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



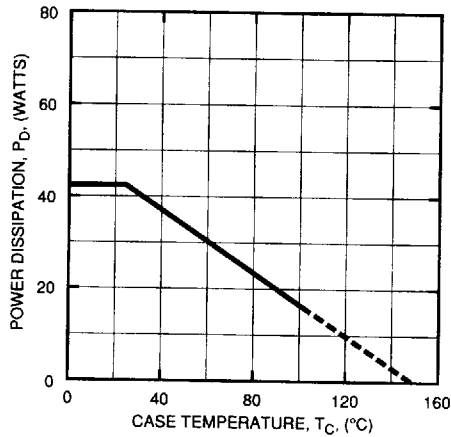
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



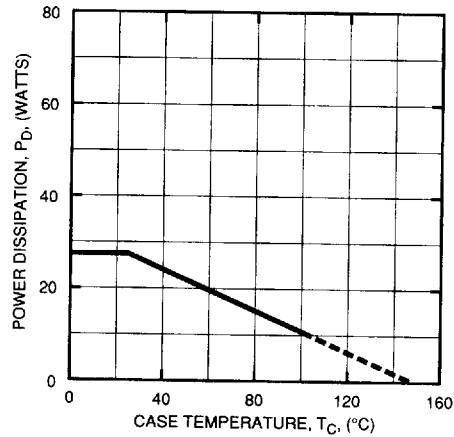
REVERSE COLLECTOR CURRENT VS. EMITTER-COLLECTOR VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)



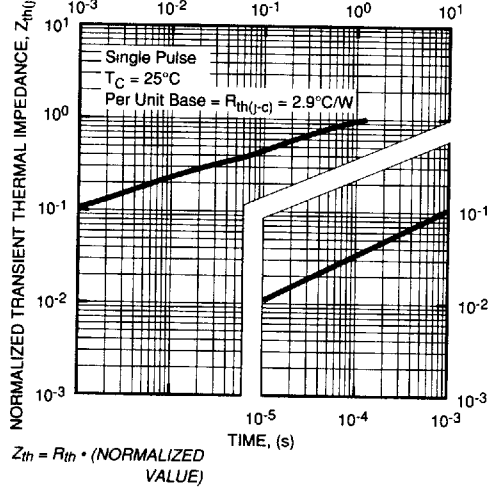
POWER DISSIPATION DERATING CURVE
(PER IGBT ELEMENT)



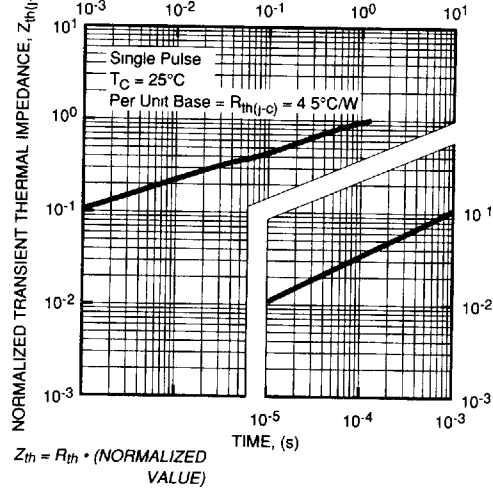
POWER DISSIPATION DERATING CURVE
(PER FWDI ELEMENT)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDI)



PM15CHA060
Intellimod-3 Modules
Three Phase IGBT Inverter Output
15 Amperes/110-230 Volt Line

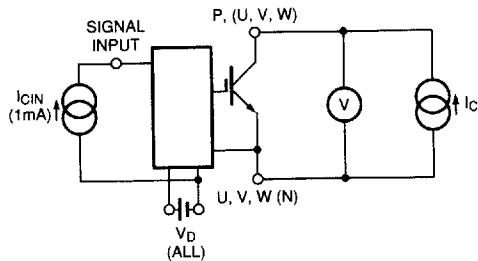


Figure 1 V_{CES} Test

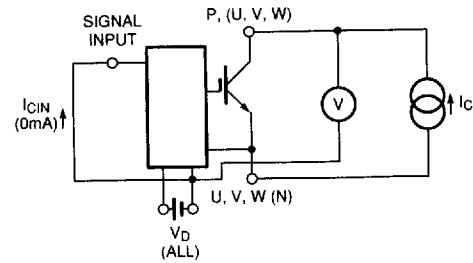


Figure 2 $V_{CE(SAT)}$ Test

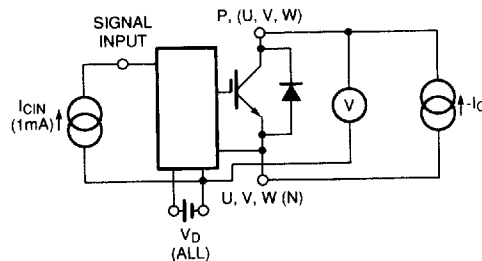
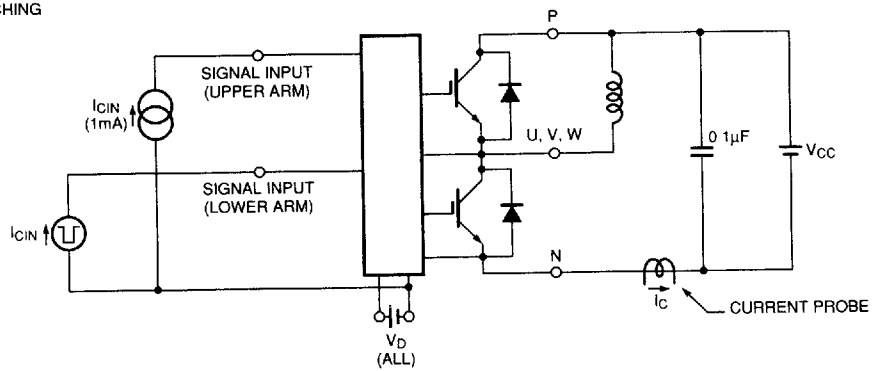


Figure 3 V_{EC} Test

A) LOWER ARM SWITCHING



B) UPPER ARM SWITCHING

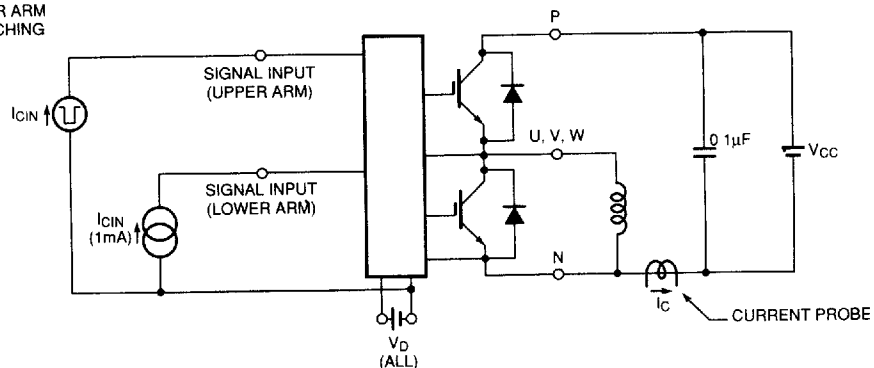


Figure 4 Switching Time Test

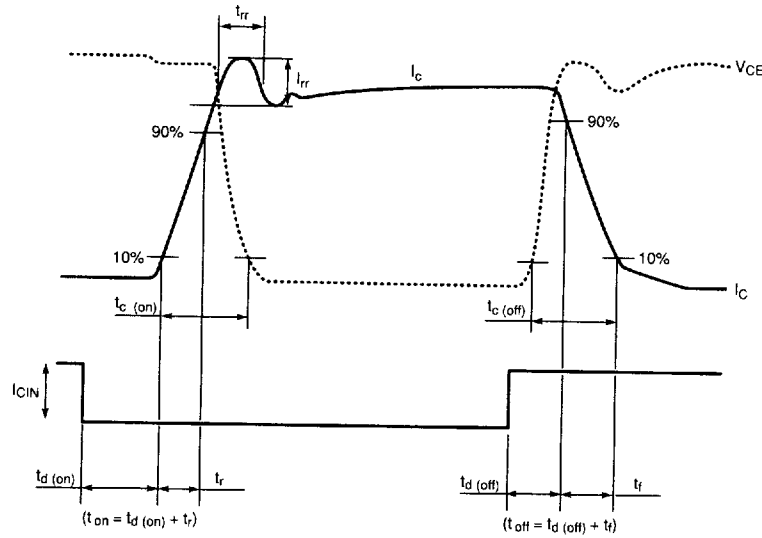


Figure 5 Switching Test Waveform

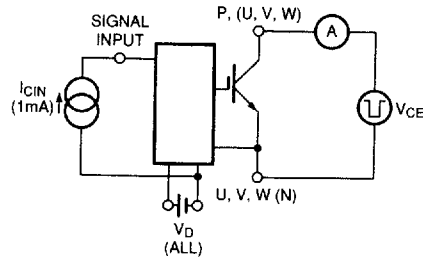


Figure 6 I_{CES} Test

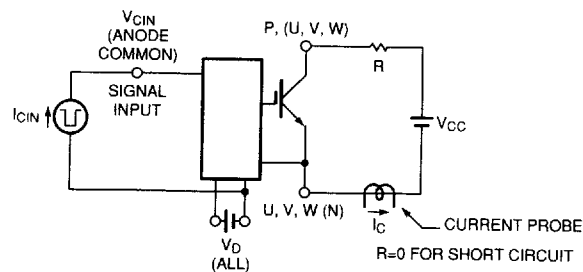


Figure 7 Over Current and Short Circuit Test