PM200DHA060

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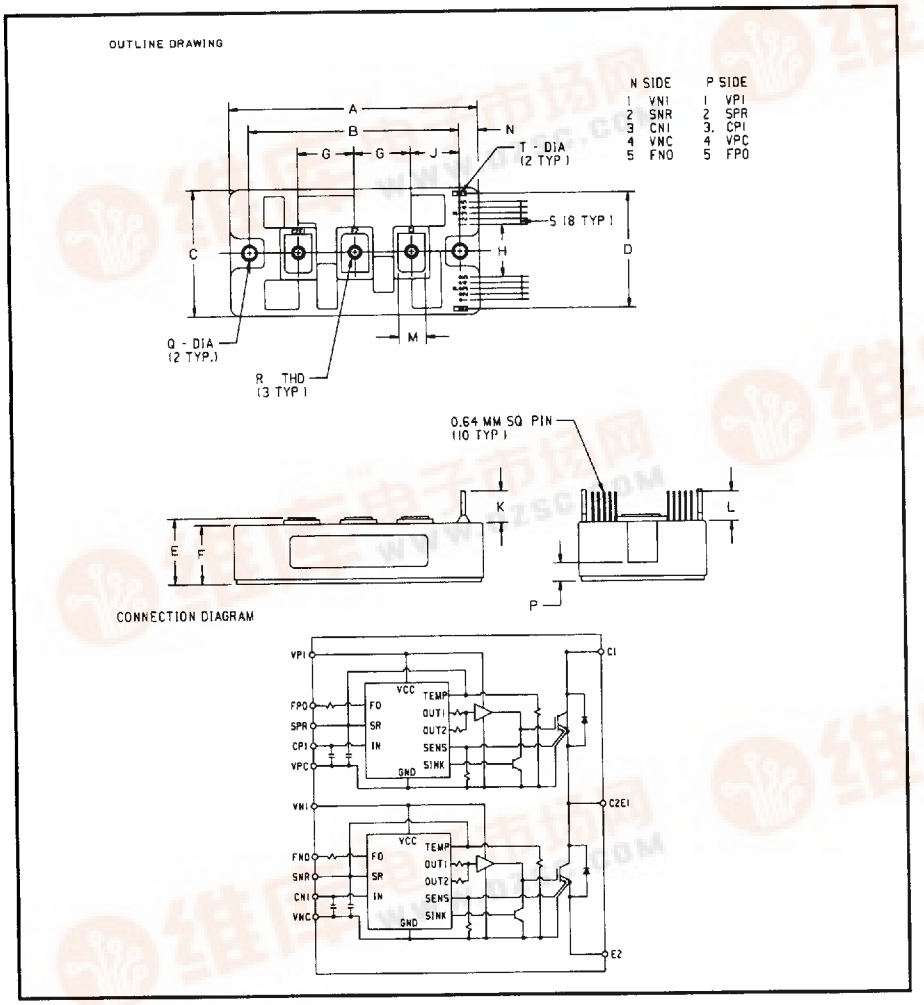
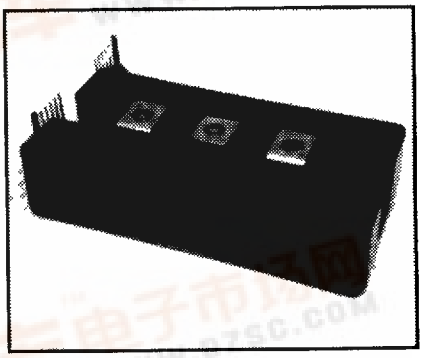
Intellimod™-3 Modules
Single Phase
IGBT Inverter Output
200 Amperes/110-230 Volt Line



110-230 Volt Line, PM200DHA060 Outline Drawing



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
PM200DHA060

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.66±0.01	93.0±0.25
C	2.2	56.0
D	2.01	51.0
E	1.14+0.04/-0.02	29.0+1.0/-0.5
F	1.02	26.0
G	0.98	25.0
H	0.9	23.0
J	0.85	21.5

Dimensions	Inches	Millimeters
K	0.55	14.0
L	0.51	13.0
M	0.47	12.0
N	0.33	8.5
P	0.31	8.0
Q	0.22 Dia.	5.5 Dia.
R	Metric M5	M5
S	0.1	2.54
T	0.08 Dia.	2.0 Dia.

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PM200DHA060
Intellimod-3 Modules
Single Phase IGBT Inverter Output
200 Amperes/110-230 Volt Line

T-57-29

Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	PM200DHA060	Units
Power Device Junction Temperature	T_j	-20 to +150	°C
Storage Temperature	T_{STG}	-40 to +125	°C
Case Operating Temperature	T_C	-20 to +100	°C
Mounting Torque, M5 Mounting Screws	—	17	Kg-cm
Mounting Torque, M5 Main Terminal Screws	—	17	Kg-cm
Module Weight (Typical)	—	430	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part)	$V_{CC(prot.)}$	400	Volts
Isolation Voltage AC 1 minute, 60Hz	V_{RMS}	2500	Volts
Control Sector			
Supply Voltage Applied between (V_{P1} - V_{PC}, V_{N1} - V_{NC})	V_D	20	Volts
Input Voltage Applied between (C_{P1} - V_{PC}, C_{N1} - V_{NC})	V_{CIN}	10	Volts
Fault Output Supply Voltage Applied between (F_{PO} - V_{PC}, F_{NO} - V_{NC})	V_{FO}	20	Volts
Fault Output Current (Sink Current at F_{PO}, F_{NO} Terminals)	I_{FO}	20	mA
IGBT Inverter Sector			
Collector-Emitter Voltage	V_{CES}	600	Volts
Collector Current ±	I_C	200	Amperes
Peak Collector Current ±	I_{CP}	400	Amperes
Supply Voltage (Applied C1 to E2)	V_{CC}	450	Volts
Supply Voltage (Surge) Applied C1 to E2	$V_{CC(surge)}$	500	Volts
Collector Dissipation	P_C	780	Watts

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PM200DHA060
Intellimod-3 Modules
Single Phase IGBT Inverter Output
200 Amperes/110-230 Volt Line

Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Overcurrent Trip Level	OC	-20°C ≤ T ≤ 125°C, Fig. 5	310	400	–	Amperes
Short Circuit Trip Level	SC	-20°C ≤ T ≤ 125°C, Fig. 5	400	560	–	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V, Fig. 5	–	5	–	µS
Over Temperature Protection	OT	Trip Level	100	110	120	°C
Over Temperature Protection	OT_R	Reset Level	85	95	105	°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_{P1} - V_{PC}, V_{N1} - V_{NC}	13.5	15	16.5	Volts
Circuit Current	I_D	V_D = 15V, V_{CIN} = 5V, V_{N1} - V_{NC}	–	13	20	mA
	I_D	V_D = 15V, V_{CIN} = 5V, V_{P1} - V_{PC}	–	13	20	mA
Input On Voltage	$V_{CIN(on)}$	Applied between C_{P1} - V_{PC}, C_{N1} - V_{NC}	1.2	1.5	1.8	Volts
Input Off Voltage	$V_{CIN(off)}$		1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3-Ø Sinusoidal	–	15	20	kHz
Dead Time	t_{DEAD}	For each Input Pulse	4.0	–	–	µS
		Using example Interface Circuit*	6.0	–	–	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	1.0	1.8	–	mS
SXR Terminal Output Voltage	V_{SXR}	T_j = 125°C, R_{IN} = 6.8kΩ, (S_{PR}, S_{NR})	4.5	5.1	5.6	Volts

*See Intellimod-3 Applications Data Section 4.3.

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200 Amperes/110-230 Volt Line

Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CES}$, T_j = 25°C, Fig. 4	–	–	1	mA
Collector Cutoff Current	I_{CEX}	$V_{CE} = V_{CES}$, T_j = 125°C, Fig. 4	–	–	10.0	mA
Diode Forward Voltage	V_{FM}	$-I_C$ = 200A, V_{CIN} = 5V, Fig. 2	–	1.6	2.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 200A, Fig. 1	–	2.6	3.5	Volts
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 200A, T_j = 125 °C, Fig. 1	–	2.4	3.4	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0V, V_{CC} = 300V, I_C = 200A, T_j = 125 °C Fig. 3	0.5	1.4	2.5	µS
	t_{rr}		–	0.2	0.4	µS
	$t_{C(on)}$		–	0.5	1.0	µS
	t_{off}		–	2.0	3.0	µS
	$t_{C(off)}$		–	0.5	1.0	µS

Thermal Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistances Junction to Case	$R_{th(j-c)Q}$	Inverter IGBT	–	–	0.16	°C/W
	$R_{th(j-c)F}$	Inverter FWD	–	–	0.35	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin, Thermal Grease Applied	–	–	0.095	°C/W

Recommended Operating Conditions

Characteristics	Symbol	Test Conditions	Value	Units
Supply Voltage	V_{CC}	Applied across C1 - E2 Terminals	0 ~ 400	Volts
	V_D	Applied between V_{P1} - V_{PC}, V_{N1} - V_{NC}	15±1.5	Volts
Input On Voltage	$V_{CIN(on)}$	Applied between C_{P1} - V_{PC}, C_{N1} - V_{NC}	0 ~ 0.8	Volts
Input Off Voltage	$V_{CIN(off)}$		4 ~ V_{SXR}	Volts
PWM Input Frequency	f_{PWM}	Using example Interface Circuit *	5 ~ 20	kHz
Minimum Dead Time	t_{DEAD}	Using example Interface Circuit *	6.0	µS

*See Intellimod-3 Applications Data Section 4.3.

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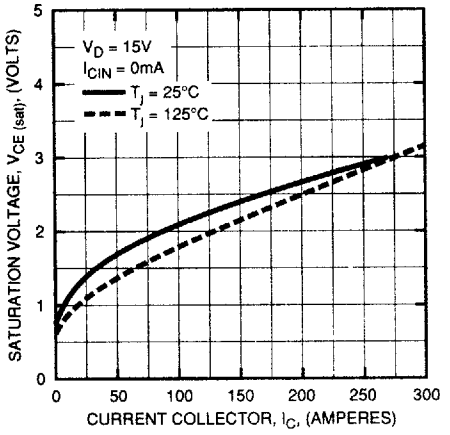
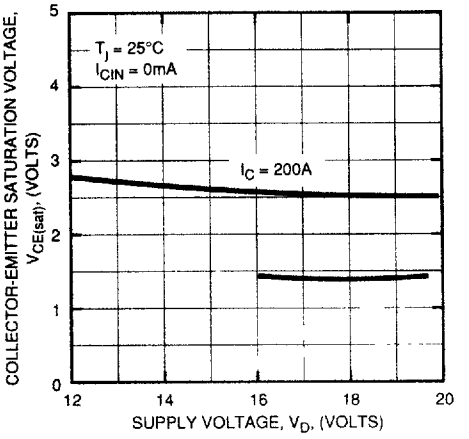
200 Amperes/110-230 Volt Line

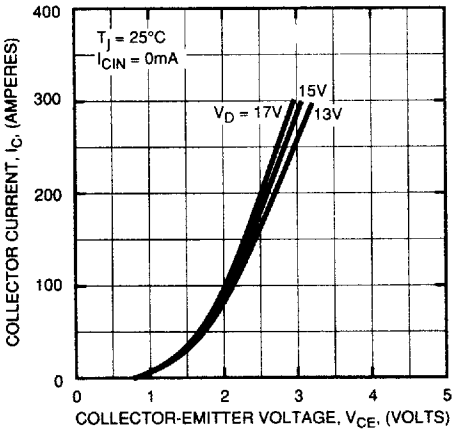
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



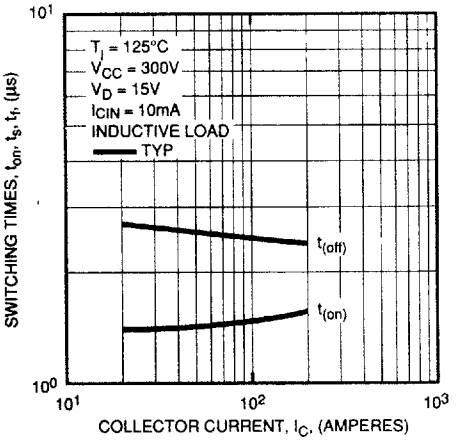
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



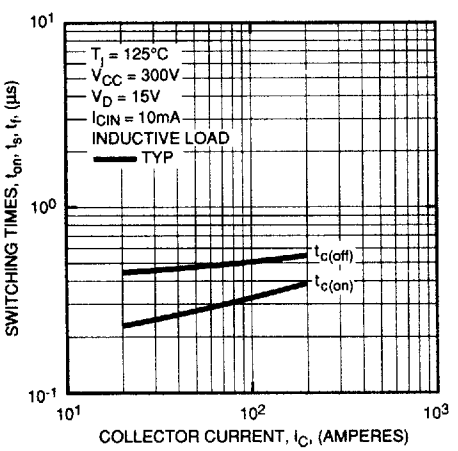
OUTPUT CHARACTERISTICS (TYPICAL)



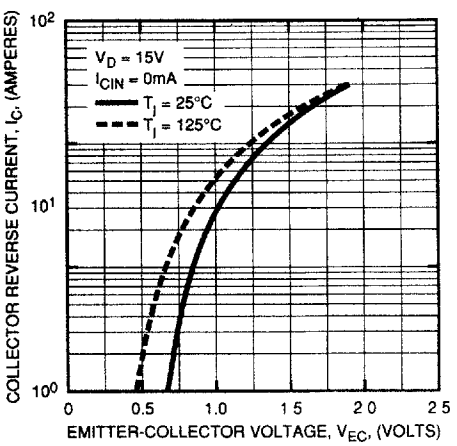
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



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



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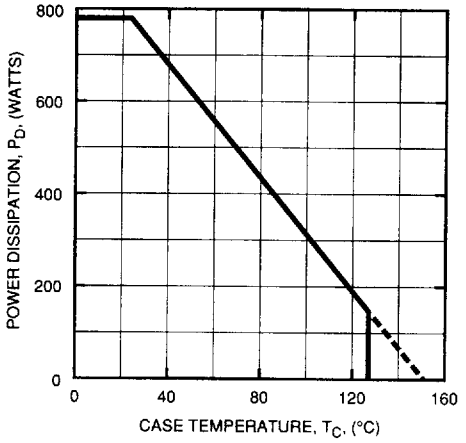
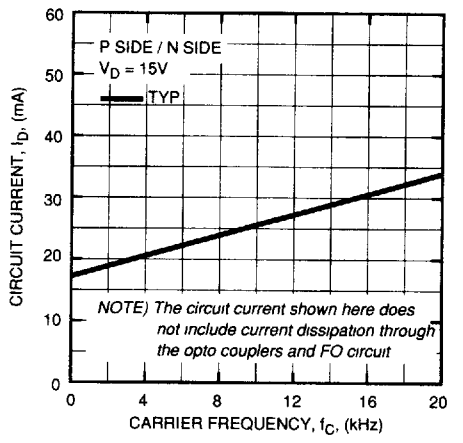
200 Amperes/110-230 Volt Line

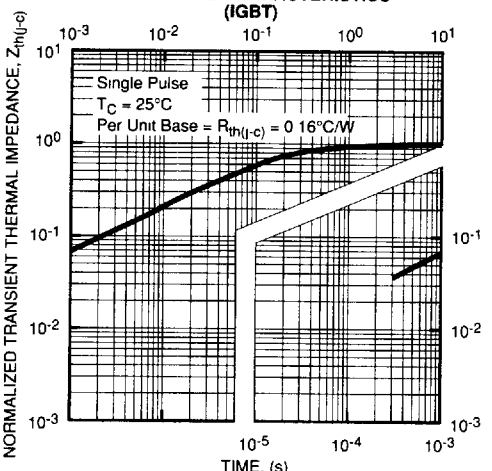
POWER DISSIPATION DERATING CURVE (PER IGBT ELEMENT)



CIRCUIT CURRENT VS. CARRIER FREQUENCY

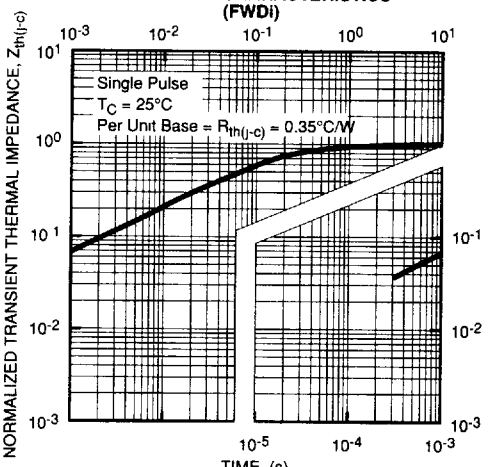


TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



$Z_{th} = R_{th}$ • (NORMALIZED VALUE)

TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)



$Z_{th} = R_{th}$ • (NORMALIZED VALUE)

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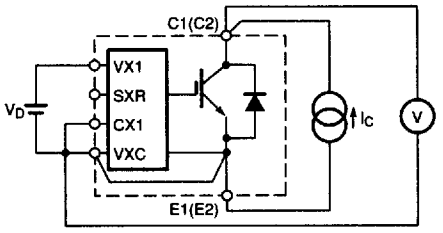

Figure 1 $V_{CE(SAT)}$ Test

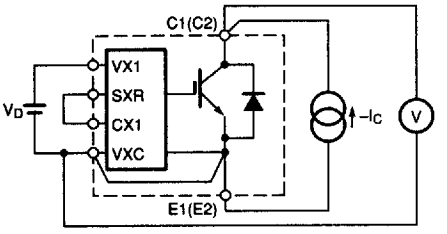

Figure 2 V_{EC} Test

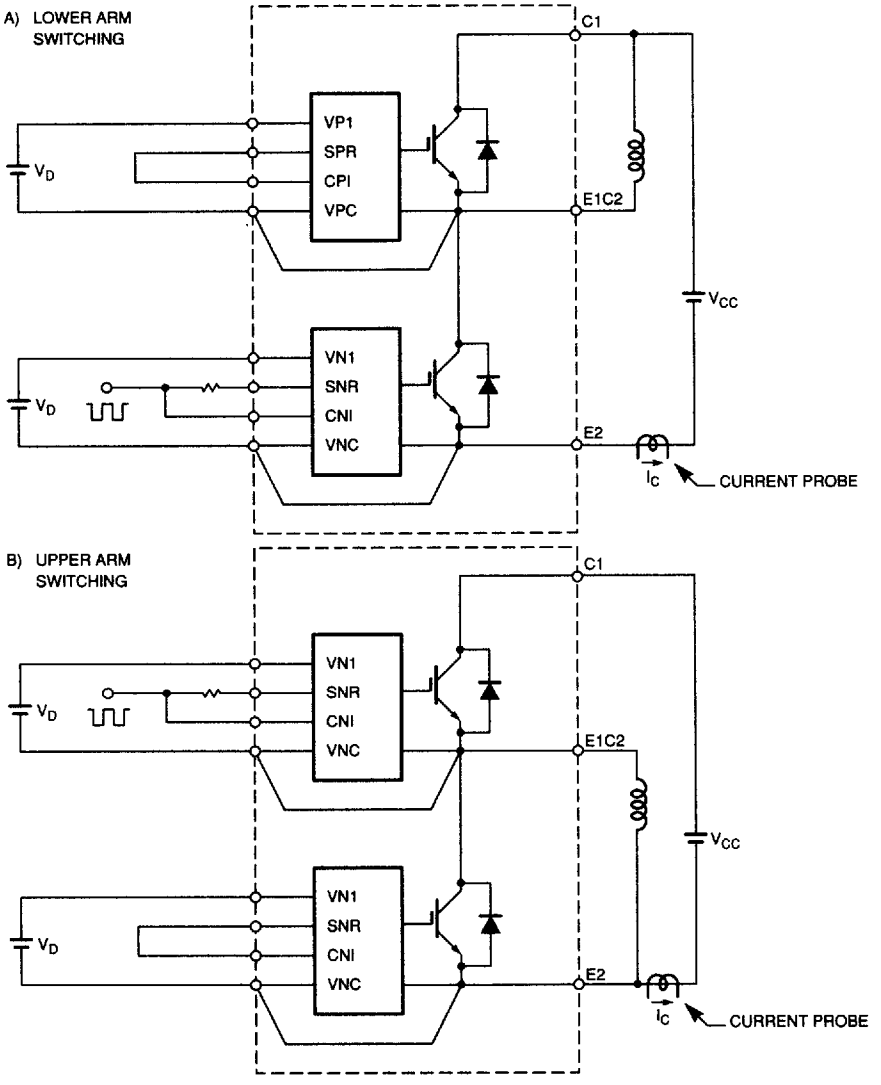

Figure 3 Half Bridge Switching Test and Waveform

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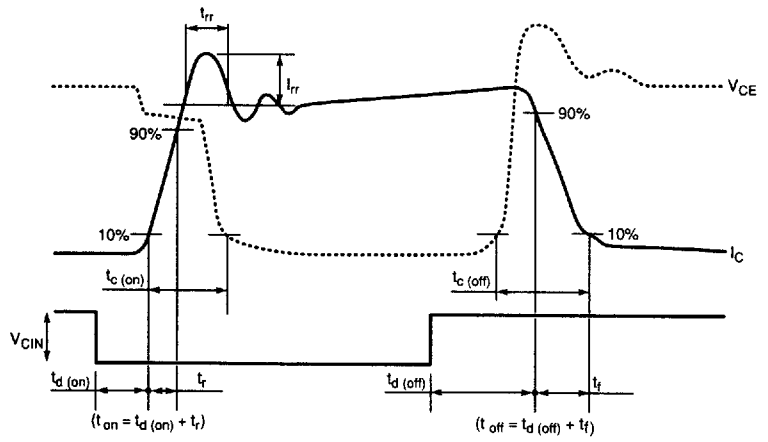

Figure 3 Half Bridge Switching Test and Waveform (Continued)

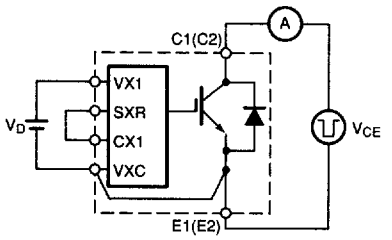

Figure 4 I_{CES} Test

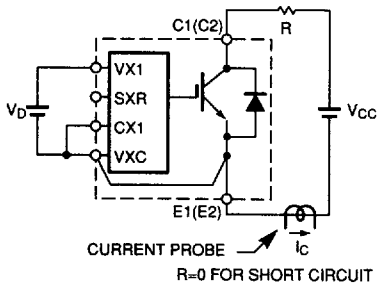

Figure 5 Over Current and Short Circuit Test