150 WATT (14 AMP CONTINUOUS, 20 AMP PEAK)

PMD 20K

FEATURES

- Electrical specifications guaranteed for operating junction temperature range of 0 - 150°C
- Guaranteed and 100% tested for I_{SB} (Secondary Breakdown Current) insuring maximum performance at high energy levels
- Built-in speed up diode for fast turn-off with negative base drive
- Low thermal resistance for more useable power and lower operating temperatures
- Hermetically sealed

DESCRIPTION

The PMD 20K Series of devices are three-terminal NPN Switching Darlington Power Transistors. These devices are monolithic epitaxial base structures with built-in base to emitter shunt resistors. They have been designed to switch at frequencies up to 30kHz. The devices are CVD glass passivated to increase reliability and provide reduced high-temperature reverse leakage current. Internal diode protection (D1) of the Darlington configuration is built into the structure to limit the device power dissipation during negative overshoot. Diode D2 is built-in to reduce device turn-off time when negative base drive is used.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM	UNITS
Collector Emitter Voltage PMD 20K120 PMD 20K150 PMD 20K200	V_{CEO}	 120 150 200	Vdc
Collector Base Voltage PMD 20K120 PMD 20K150 PMD 20K200	V_{CBO}	 120 150 200	Vdc
Emitter Base Voltage	V_{EBO}	2	Vdc
Collector Current Continuous Peak	I_C	 14 20	Adc
Base Current	I_B	0 5	Adc
Thermal Resistance	θ_{JC}	1 0	°C/Watt
Total Internal Power Dissipation @ T_C = 0°C[1]	P_D	150	Watts
Operating Junction and Storage Temperature	T_J T_{STG}	−65 to +150 −65 to +200	°C

[1] For operation above T_C = 0°C, derate @ 1 W/°C

DEVICE SELECTION GUIDE

DEVICE	VOLTAGE RATING
PMD 20K120	120V
PMD 20K150	150V
PMD 20K200	200V

Excellent thermal resistance junction to case (θ_{JC}) provides for more useable power at lower operating temperatures. This, coupled with 100% I_{SB} testing, insures optimum performance and durability in power applications such as switching regulators and inverters. These Darlington devices are hermetically sealed steel TO-3 packages providing high reliability and low thermal resistance.

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ELECTRICAL CHARACTERISTICS

All parameters are guaranteed at T_J = 0 to 150°C, unless otherwise specified.

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Parameter	Symbol	Test Conditions	Minimum	Maximum	Units
ON CHARACTERISTICS					
Collector Emitter Saturation Voltage[1]	$V_{CE(sat)}$	I_C = 10 Adc; I_B = 50 mAdc		1 7[2] 1 8	Vdc
Base Emitter Turn-on Voltage[1]	$V_{BE(on)}$	I_C = 10 Adc; V_{CE} = 3 Vdc		2 6[2] 2.8	Vdc
Base Emitter Saturation[1]	$V_{BE(sat)}$	I_C = 10 Adc; I_B = 50 mAdc		2 6[2] 2 8	Vdc
DC Current Gain[1]	h_{FE}	I_C = 10 Adc, V_{CE} = 3 Vdc	300		
Forward Bias Secondary Breakdown Current	$I_{s/b}$	V_{CE} = 26 Vdc; T_A = 25°C 1 sec non-repetitive pulse	5.8		Adc
Secondary Breakdown Energy	$E_{s/b}$	I_C = 8 43 Adc; L = 45μH T_A = 25°C	1 6		mJoules
OFF CHARACTERISTICS					
Collector Emitter Breakdown Voltage[1] (Base Open) PMD 20K120 PMD 20K150 PMD 20K200	$V_{(BR)CEO}$	I_{CE} = 100 mAdc; I_B = 0 T_J = 25°C	 120 150 200		Vdc
Collector Emitter Sustaining Voltage[1] PMD 20K120 PMD 20K150 PMD 20K200	$V_{(SUS)CER}$	I_{CE} = 100 mAdc; R_{BE} = 2 2kΩ	 120 150 200		Vdc
Emitter Base Leakage Current	I_{EBO}	V_{EB} = 0.9 Vdc, I_C = 0A		70	mAdc
Collector Emitter Leakage Current PMD 20K120 PMD 20K150 PMD 20K200	I_{CER}	 V_{CE} = 80 Vdc; R_{BE} = 2 2kΩ V_{CE} = 100 Vdc; R_{BE} = 2 2kΩ V_{CE} = 150 Vdc; R_{BE} = 2 2kΩ		 5 0 5 0 5 0	mAdc
Collector Emitter Leakage Current (Base Open)[2] PMD 20K120 PMD 20K150 PMD 20K200	I_{CEO}	 V_{CE} = 80 Vdc V_{CE} = 100 Vdc V_{CE} = 150 Vdc		 0.5 0.5 0 5	mAdc
DYNAMIC CHARACTERISTICS[2,3]					
Rise Time	t_r	I_C = 10 Adc, V_{CC} = 30V		0.3	μS
Turn-On Time	t_{on}	I_C = 10 Adc; V_{CC} = 30V		0 5	μS
Fall Time	t_f	I_C = 10 Adc, V_{CC} = 30V		0 8	μS
Turn-Off Time	t_{off}	I_C = 10 Adc; V_{CC} = 30V		1.0	μS

(1) Pulse tested with pulse width ≤ 300 μS and duty cycle ≤ 2 0%
(2) T_J = 25°C
(3) See AC test circuit

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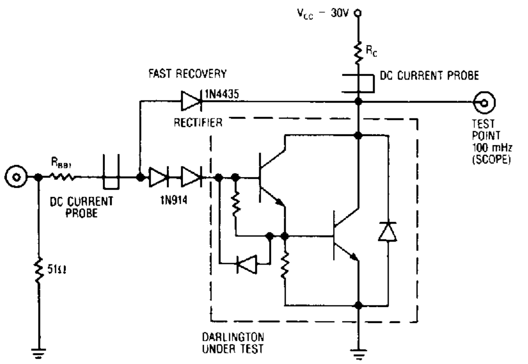
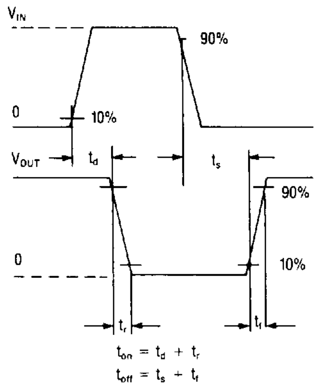
OPERATIONAL DATA

AC TEST CIRCUIT



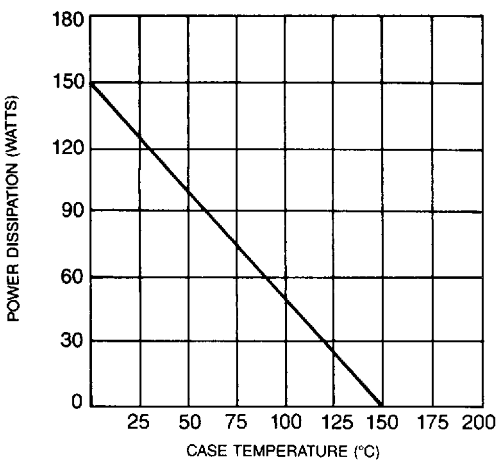
Adjust R_c to obtain desired I_C
Adjust V_{IN}, R_{BB1} to obtain I_{B1} − I_C/100
Adjust V_{IN} to 1% duty cycle with pulse rise and fall times less than 10nS

SWITCHING WAVEFORMS

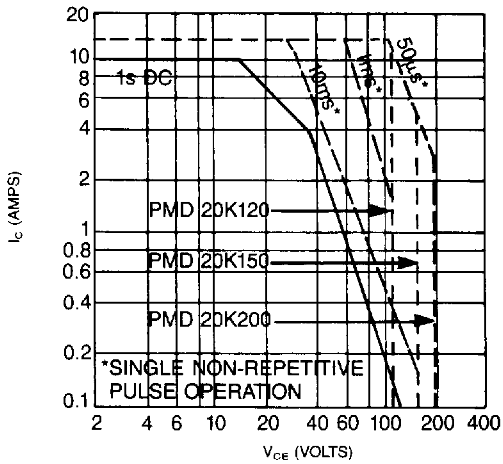


Switching times are specified only under the condition that the device under test is not allowed to enter classical saturation. A Baker Clamp is used to insure that the base-collector junction of the DUT is never forward biased under worst case temperature and drive conditions.

POWER DERATING



SAFE OPERATING AREA



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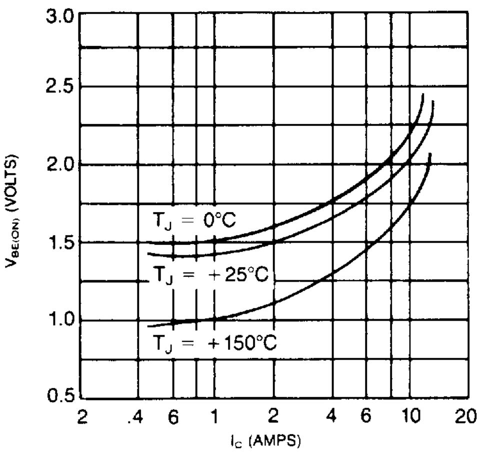
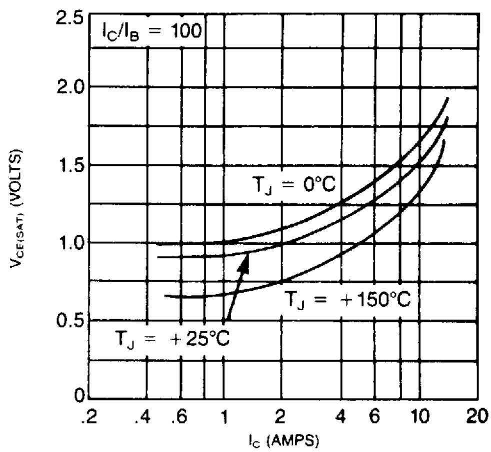
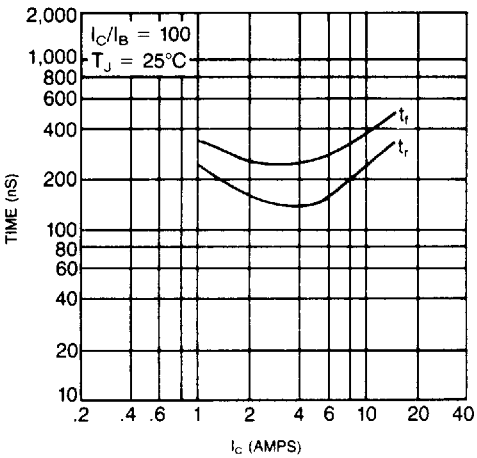
$V_{BE(ON)}$ VS COLLECTOR CURRENT



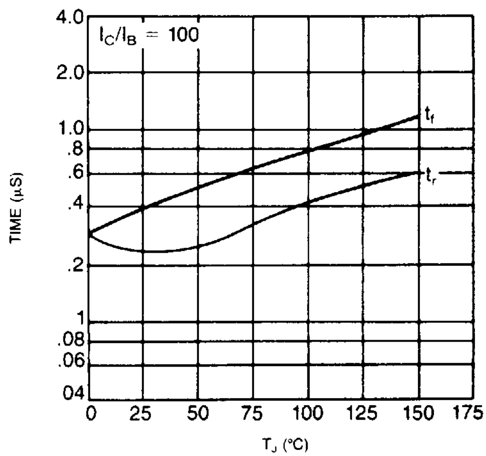
$V_{CE(SAT)}$ VS COLLECTOR CURRENT



DYNAMIC CHARACTERISTICS VS COLLECTOR CURRENT



DYNAMIC CHARACTERISTICS VS JUNCTION TEMPERATURE



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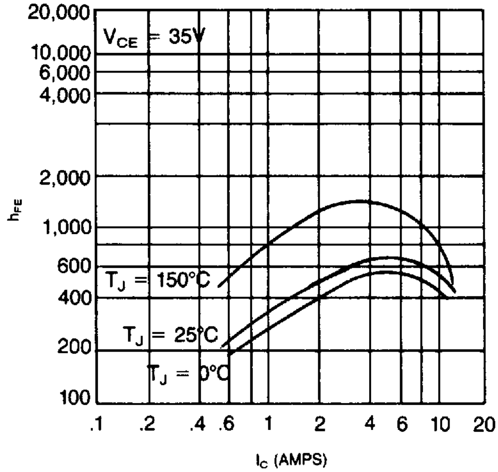
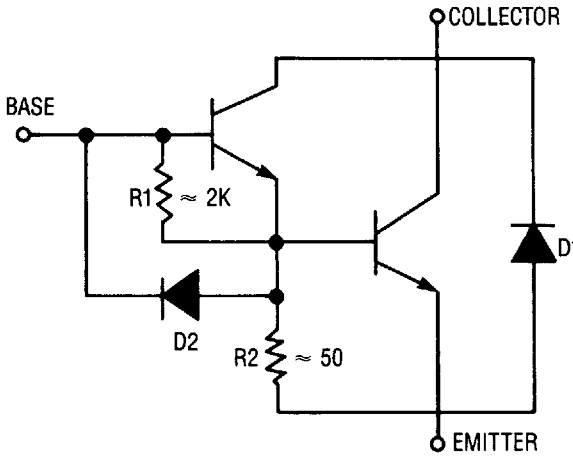
DC COLLECTOR CURRENT GAIN
VS COLLECTOR CURRENT



BLOCK DIAGRAM



(An external fast recovery diode connected in parallel to D1 will increase efficiency in DC-DC switching converters.)

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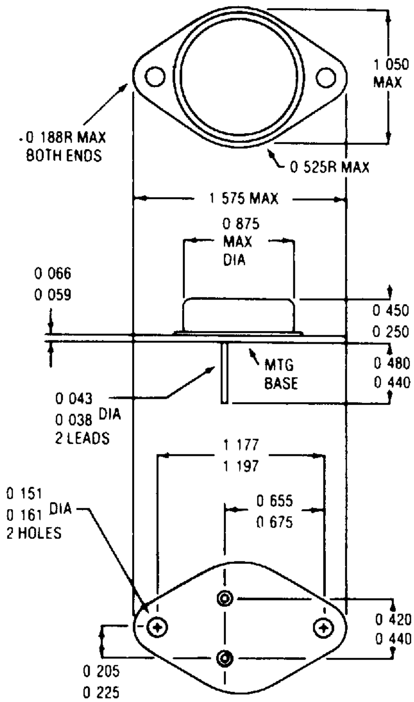
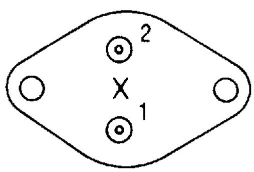
DEVICE OUTLINE



Bottom View



1 – Base
2 – Emitter
Case is Collector

NOTE: Case temperature measured at point X.
All dimensions are in inches.