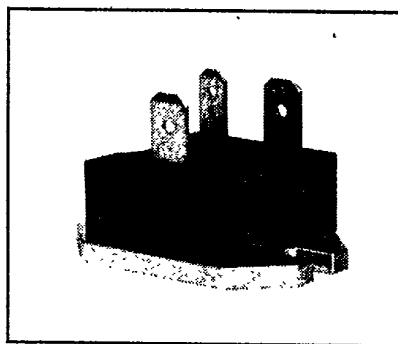
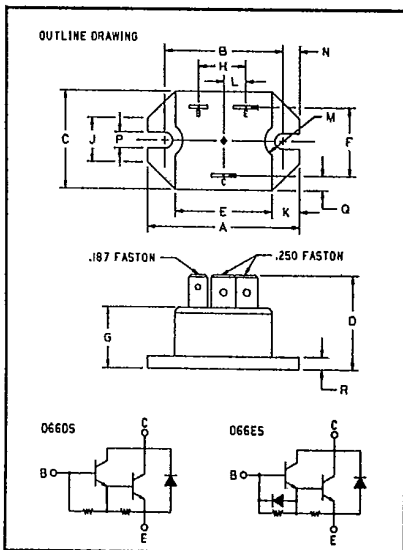




**D66DS**  
**D66ES**

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

**Fast Switching  
Single Darlington  
Transistor Module  
20 Amperes  
500-600-700 Volts**



**D66DS**  
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**Fast Switching Single Darlington  
Transistor Module**  
20 Amperes/500-600-700 Volts

**Description**

Powerex Fast Switching Single Darlington Transistor Modules are designed for use in switching applications. The modules are isolated consisting of one Darlington Transistor with a monolithic reverse parallel connected free-wheel diode.

**Features:**

- Isolated Mounting
- High Gain ( $h_{FE}$ )
- Quick Connect Terminals
- Base Emitter Speed-up Diode (D66ES)

**Applications:**

- UPS Inverters
- DC Motor Control
- Switching Power Supplies
- AC Motor Control

**Ordering Information**

Example: Select the complete six digit module part number you desire from the table - i.e. D66DS7 is a 700 Volt, 20 Ampere Fast Switching Single Darlington Module without speed-up diode. D66ES7 is a 700 Volt, 20 Ampere Fast Switching Darlington Module with speed-up diode.

**500-600-700 Volts D66DS, D66ES  
Outline Drawing**

Dimension	Inches	Millimeters
A	1.52	38.6
B	1.186 ± .006	30 ± 0.15
C	1000 ± .015	25.4 ± 0.4
D	.97	24.6
E	.96	24.4
F	.694 ± .010	17.6 ± 0.25
G	.625 ± .020	15.9 ± 0.5
H	.474 ± .010	12 ± 0.25
J	.450	11.4
K	.275	7
L	.220 ± .010	5.6 ± 0.25
M	.180 R	4.6 R
N	.167 ± .010	4.2 ± 0.25
P	.160 ± .010	4.1 ± 0.25
Q	.15	3.8
R	.126 ± .006	3.2 ± 0.15

Type	V <sub>CEV(SUS)</sub> Volts (×100)	Current Rating Amperes (20)
D66DS/D66ES	5	20
D66DS/D66ES	6	20
D66DS/D66ES	7	20



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**D66DS**

**D66ES**

**Fast Switching Single Darlington Transistor Module**  
20 Amperes/500-600-700 Volts

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

	Symbol	D66DS/D66ES	Units
Junction Temperature	$T_J$	-40 to 150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40 to 150	$^\circ\text{C}$
Collector-Emitter Sustaining Voltage D66DS5/ES5	$V_{CEO(SUS)}$	400	Volts
Collector-Emitter Voltage $V_{BE} = -1.5\text{V}$ D66DS5/ES5	$V_{CEV}$	500	Volts
Collector-Emitter Sustaining Voltage D66DS6/ES6	$V_{CEO(SUS)}$	450	Volts
Collector-Emitter Voltage $V_{BE} = -1.5\text{V}$ D66DS6/ES6	$V_{CEV}$	600	Volts
Collector-Emitter Sustaining Voltage D66DS7/ES7	$V_{CEO(SUS)}$	500	Volts
Collector-Emitter Voltage $V_{BE} = -1.5\text{V}$ D66DS7/ES7	$V_{CEV}$	700	Volts
Emitter-Base Voltage D66DS	$V_{EBO}$	8	Volts
D66ES	$V_{EBO}$	5	Volts
Continuous Collector Current	$I_C$	20	Amperes
Peak (Repetitive) Collector Current	$I_{CM}$	30	Amperes
Peak (Non-Repetitive) Collector Current	$I_{CSM}$	50	Amperes
Diode Forward Current	$I_{FM}$	20	Amperes
Continuous Base Current	$I_B$	5	Amperes
Peak (Non-Repetitive) Base Current	$I_{BM}$	10	Amperes
Power Dissipation	$P_T$	62.5	Watts
Max. Mounting Torque (M3) Mounting Screws	—	8	in.-lb.
V Isolation	$V_{RMS}$	2500	Volts



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D66DS  
D66ES

Fast Switching Single Darlington Transistor Module  
20 Amperes/500-600-700 Volts

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

Characteristics	Symbol	Test Conditions	D66DS, D66ES			Units
			Min.	Typ.	Max.	
Collector Cutoff Current	$I_{CEV}$	$V_{CE} = V_{CEV}(\text{rated}), V_{BE} = -1.5\text{V}$	—	—	1	mA
Collector Cutoff Current	$I_{CEV}$	$V_{CE} = V_{CEV}(\text{rated}), V_{BE} = -1.5\text{V}$ $T_C = 150^\circ\text{C}$	—	—	2.5	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 4.5\text{V}, \text{D66DS}$	—	—	200	mA
		$V_{EB} = 1.5\text{V}, \text{D66ES}$	—	—	200	mA
DC Current Gain	$h_{FE}$	$I_C = 30\text{A}, V_{CE} = 5.0\text{V}$	20	35	—	—
		$I_C = 20\text{A}, V_{CE} = 5.0\text{V}$	40	85	—	—
		$I_C = 10\text{A}, V_{CE} = 5.0\text{V}$	100	160	—	—
Collector-Emitter Saturation Voltage	$V_{CE(\text{SAT})}$	$I_C = 30\text{A}, I_B = 3.0\text{A}$	—	2.1	3.5	V
		$I_C = 20\text{A}, I_B = 2.0\text{A}$	—	1.6	2.5	V
		$I_C = 10\text{A}, I_B = 1.0\text{A}$	—	1.2	1.7	V
Base-Emitter Saturation Voltage	$V_{BE(\text{SAT})}$	$I_C = 30\text{A}, I_B = 3.0\text{A}$	—	2.65	4.0	V
		$I_C = 20\text{A}, I_B = 2.0\text{A}$	—	2.3	3.0	V
		$I_C = 10\text{A}, I_B = 1.0\text{A}$	—	1.8	2.5	V
Delay Time*	$t_d$		—	0.05	0.5	$\mu\text{s}$
Rise Time*	$t_r$	$V_{CC} = 250\text{V}, I_C = 20\text{A}$	—	0.4	1.0	$\mu\text{s}$
Storage Time*	DS ES	$I_{B1} = 1\text{A}, -I_{B2} = 2.0\text{A}$	—	2.2	5.0	$\mu\text{s}$
			—	1.8	3.0	$\mu\text{s}$
Fall Time*	DS ES	$t_p = 50 \mu\text{sec}$	—	1.6	3.0	$\mu\text{s}$
			—	.45	1.0	$\mu\text{s}$
Diode Forward Voltage	$V_{FM}$	$I_{FM} = 10\text{A}$	—	1.95	3.20	V
		$I_{FM} = 25\text{A}$	—	2.8	4.00	V
		$I_{FM} = 25\text{A}, T_J = 150^\circ\text{C}$	—	2.75	4.00	V
Reverse Recovery time	$t_{rr}$	$I_{FM} = 25\text{A}, di/dt = 10\text{A}/\mu\text{sec}$ $R_{B1E} = .25\Omega$	—	3.85	10.0	$\mu\text{s}$
Forward Turn-On Time	$t_{ON}$	$I_{FM} = 25\text{A}, di/dt = 50\text{A}/\mu\text{sec}$	—	0.42	1.0	$\mu\text{s}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Transistor Part	—	—	2.0	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Diode Part	—	—	2.0	$^\circ\text{C}/\text{W}$

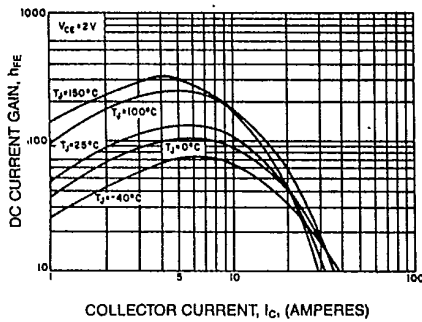
\*Resistive Load



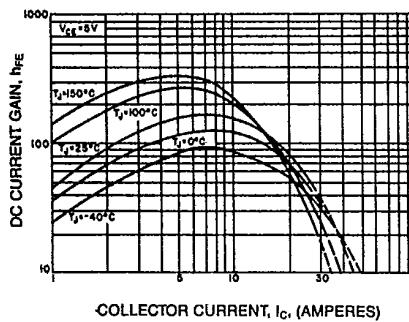
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**D66DS**  
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 Fast Switching Single Darlington Transistor Module  
 20 Amperes/500-600-700 Volts

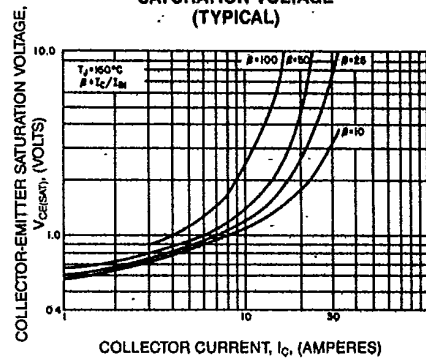
DC CURRENT GAIN (TYPICAL)



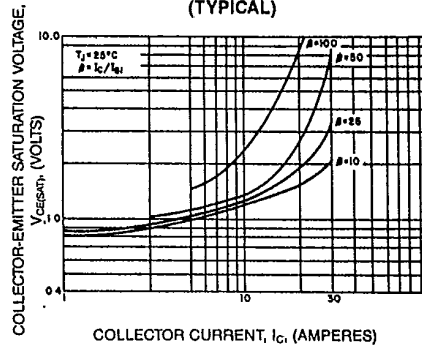
DC CURRENT GAIN (TYPICAL)



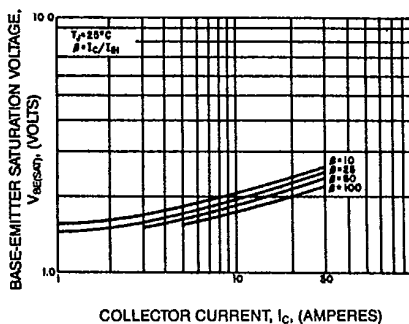
SATURATION VOLTAGE (TYPICAL)



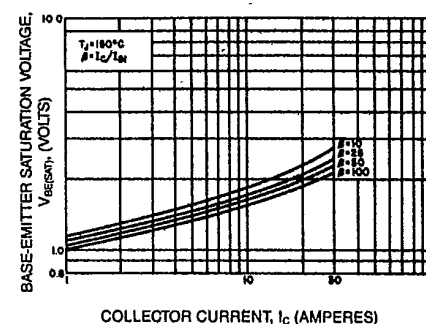
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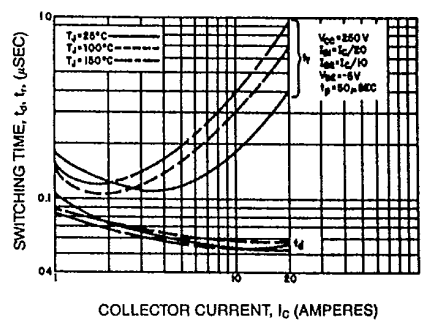
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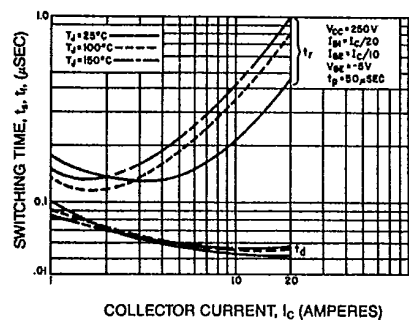
SATURATION VOLTAGE (TYPICAL)



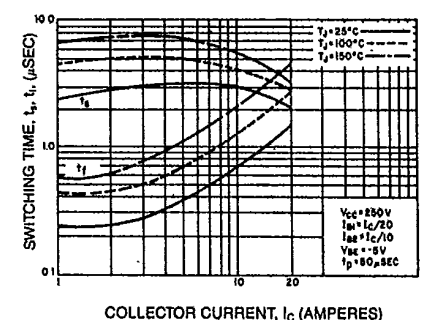
SWITCHING CHARACTERISTICS (TYPICAL)



SWITCHING CHARACTERISTICS (TYPICAL)



SWITCHING CHARACTERISTICS (TYPICAL)





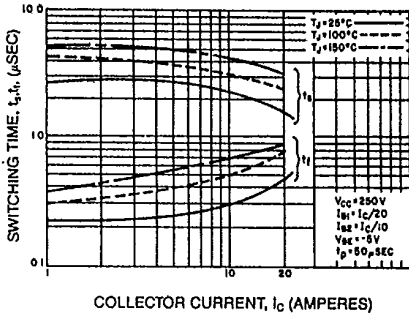
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D66DS

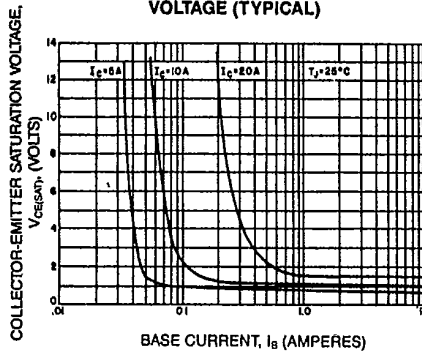
D66ES

Fast Switching Single Darlington Transistor Module  
20 Amperes/500-600-700 Volts

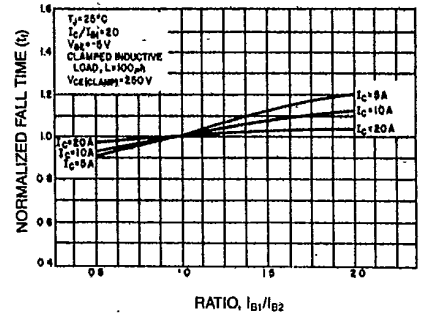
SWITCHING CHARACTERISTICS (TYPICAL)



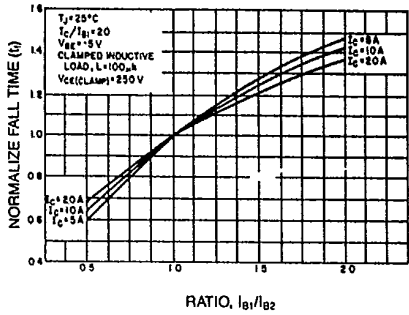
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



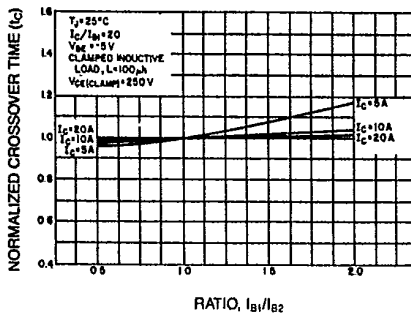
SWITCHING-TIME VS. BASE CURRENT (TYPICAL)



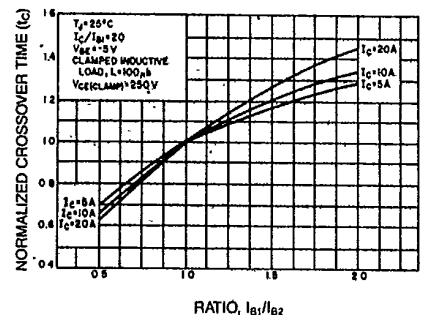
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



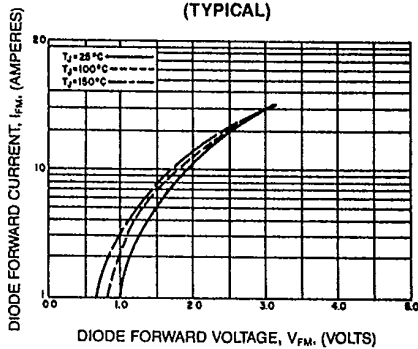
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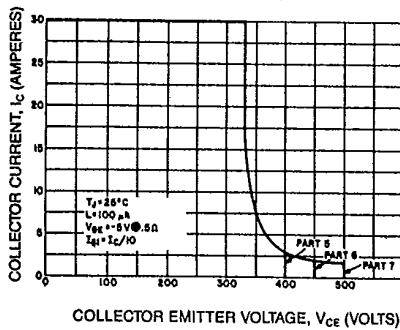
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



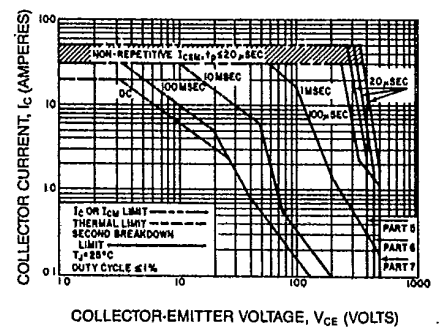
DIODE CHARACTERISTICS (TYPICAL)



REVERSE BIAS SAFE OPERATING AREA (R.B.S.O.A.)



FORWARD BIAS SAFE OPERATING AREA (S.O.A.)

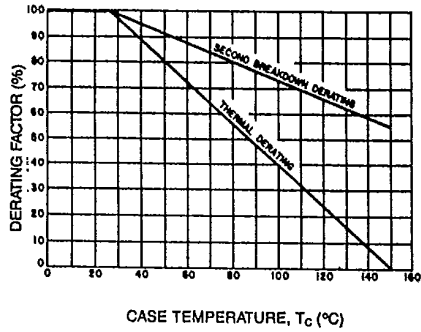




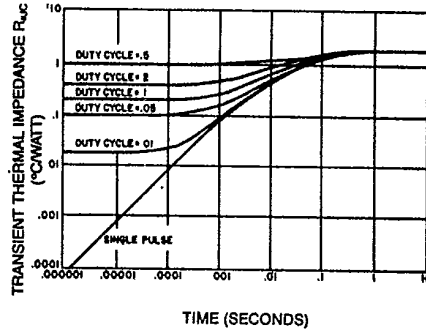
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**D66DS**  
**D66ES**  
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 20 Ampere/500-600-700 Volts

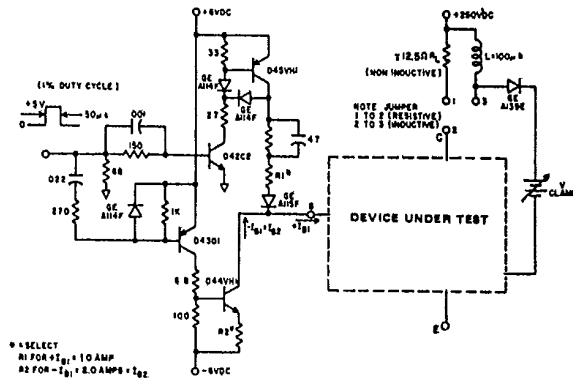
**DERATING FACTOR OF SAFE OPERATING AREA (S.O.A.)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)**



**Switching Time Test Circuit**





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