



D7ST

T-33-15

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

NPN Power Switching Transistors

100-200 Amperes
400-500 Volts

Features:

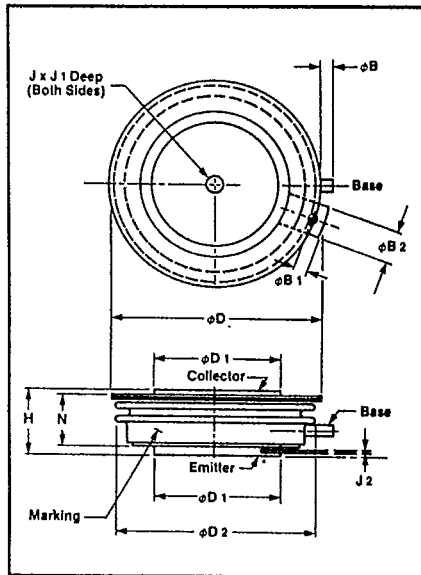
- ☐ Triple Diffused Design
- ☐ Compression Bonded Construction
- ☐ High Power Capability
- ☐ Fast Switching
- ☐ Double Sided Cooling

Applications:

- ☐ High Frequency Inverters
- ☐ Motor Controls
- ☐ Switching Regulators
- ☐ VLF Transmitters
- ☐ Induction Heating
- ☐ Power Supplies

Ordering Information

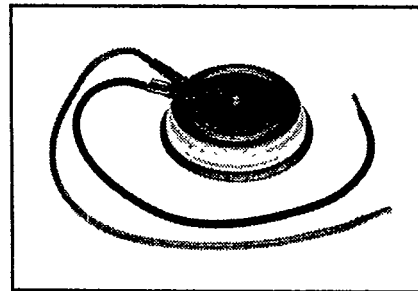
Example: Select the complete ten digit part number you desire from the table—i.e. a D7ST401310 describes a disc package transistor rated at 400 Volts, 130 Amperes; and a gain of 10 at rated current (130 Amperes).



D7ST, 400-500 Volts Outline Drawing

Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
ϕB	.121	.171	3.07	4.34
ϕB_1	.097	.122	.246	3.10
ϕB_2	.307	.317	7.80	8.05
ϕD	1.824	1.99	46.3	50.55
ϕD_1	1.155	1.161	29.34	29.49
ϕD_2	1.78	1.85	45.21	46.99
H	.611	.635	1.55	1.66
J ₁	.136	1.44	3.45	3.66
J ₁	.072	.083	1.83	2.11
J ₂	.067	.071	1.70	1.803
N	.433	.453	11.0	11.51

Creep Distance—.390 in. min. (9.9mm)
Strike Distance—.145 in. min. (3.6mm).
Finish—Nickel Plate,
Approx. Weight—3.7 oz. (105 g.)
Dimension H is a clamped dimension.



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Type	V _{CE(sat)} Volts (× 100)	Current Rating Amperes (× 10)	Gain
D7ST	40	10	10
	45	13	
	50	15	
	17		
	20		

NOTE: All voltage classes not available in all current ranges.



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Maximum Ratings

Characteristics	Symbol	D7ST	Units
Operating and Storage Temperature	T_J/T_{STG}	-65 to 200	$^{\circ}\text{C}$
Emitter-Base Voltage	V_{EBO}	7	Volts
Peak Collector Current	I_C	400	Amperes
Continuous Collector Current	I_B	75	Amperes
Linear Power Derating Factor from $T_C = 25^{\circ}\text{C}$ to $T_C = 175^{\circ}\text{C}$	—	20	$\text{W}/^{\circ}\text{C}$
Thermal Resistance	$R_{\theta JC}$	.05	$^{\circ}\text{C}/\text{W}$
Power Dissipation $T_C = 25^{\circ}\text{C}$	P_T	3000	Watts
Power Dissipation $T_C = 75^{\circ}\text{C}$	P_T	2000	Watts
Mounting Force	—	1200	lb.
Mounting Force	—	5.4	kN

D7ST4010
D7ST4013
D7ST4015
D7ST4017
D7ST4020

D7ST4510
D7ST4513
D7ST4515
D7ST4517
D7ST4520

D7ST5010
D7ST5013
D7ST5015
D7ST5017

Collector Emitter Sustaining Voltage ①	$V_{CE(sus)}$	400	450	500	Volts
Collector Base Voltage	V_{CBO}	450	500	550	Volts
Collector Emitter Voltage $V_{BE} = -1.5\text{V}$	V_{CEV}	450	500	550	Volts

① $V_{CE(sus)}$ must not be measured on a curve tracer.



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

Characteristics	Symbol	Test Conditions	Min.	D7ST Typ.	Max.	Units
Collector Cutoff Current (Base Emitter Reverse Biased)	I_{CEV}	At Rated V_{CEV} $V_{BE(OFF)} = -1.5\text{V}$	—	—	3	mA
Collector Cutoff Current (Base Emitter Reverse Biased)	I_{CEV}	At Rated V_{CEV} $V_{BE(OFF)} = -1.5\text{V}, T_j = 150^\circ\text{C}$	—	—	9	mA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 7\text{V}$	—	—	100	mA
DC Current Gain	h_{FE}	$I_C = \text{Gain Rated}, V_{CE} = 2.5\text{V}$	10	—	—	—
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = \text{Gain Rated}, I_C/I_B = 6.66$	—	—	1.00	Volts
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = \text{Gain Rated}, I_C/I_B = 6.66$ $T_j = 150^\circ\text{C}$	—	1.50	—	Volts
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	$I_C = \text{Gain Rated}, I_C/I_B = 6.66$	—	—	1.75	Volts
Thermal Resistance Junction to Case Double Sided Cooling	$R_{\theta JC}$	$V_{CE} = 20\text{V}$	—	—	.05	$^\circ\text{C/W}$
Thermal Resistance Case to Sink Lubricated	$R_{\theta CS}$	$V_{CE} = 20\text{V}$	—	—	.02	$^\circ\text{C/W}$
D7ST__10						
DC Current Gain	h_{FE}	$I_C = 200\text{A}, V_{CE} = 2.5\text{V}$	—	5	—	—
Turn-On Delay	t_d	$V_{CC} = 250\text{V}, I_C = 100\text{A}$	—	—	300	ns
Resistive Load Rise Time	t_r	$I_{B1} = -I_{B2} = 15\text{A}$	—	—	1.0	μs
Switch Times Storage Time	t_s	$t_p = 50 \mu\text{s}$	—	—	4	μs
Fall Time	t_f	Duty Cycle < 2%	—	—	0.75	μs
D7ST__13						
DC Current Gain	h_{FE}	$I_C = 250\text{A}, V_{CE} = 2.5\text{V}$	—	5	—	—
Turn-On Delay	t_d	$V_{CC} = 250\text{V}, I_C = 125\text{A}$	—	—	300	ns
Resistive Load Rise Time	t_r	$I_{B1} = -I_{B2} = 18.75\text{A}$	—	—	1.1	μs
Switch Times Storage Time	t_s	$t_p = 50 \mu\text{s}$	—	—	4	μs
Fall Time	t_f	Duty Cycle < 2%	—	—	0.75	μs
D7ST__15						
DC Current Gain	h_{FE}	$I_C = 300\text{A}, V_{CE} = 2.5\text{V}$	—	5	—	—
Turn-On Delay	t_d	$V_{CC} = 250\text{V}, I_C = 150\text{A}$	—	—	300	ns
Resistive Load Rise Time	t_r	$I_{B1} = -I_{B2} = 22.5\text{A}$	—	—	1.2	μs
Switch Times Storage Time	t_s	$t_p = 50 \mu\text{s}$	—	—	4	μs
Fall Time	t_f	Duty Cycle < 2%	—	—	0.75	μs
D7ST__17						
DC Current Gain	h_{FE}	$I_C = 340\text{A}, V_{CE} = 2.5\text{V}$	—	5	—	—
Turn-On Delay	t_d	$V_{CC} = 250\text{V}, I_C = 170\text{A}$	—	—	300	ns
Resistive Load Rise Time	t_r	$I_{B1} = -I_{B2} = 25.5\text{A}$	—	—	1.3	μs
Switch Times Storage Time	t_s	$t_p = 50 \mu\text{s}$	—	—	5	μs
Fall Time	t_f	Duty Cycle < 2%	—	—	0.75	μs
D7ST__20						
DC Current Gain	h_{FE}	$I_C = 400\text{A}, V_{CE} = 2.5\text{V}$	—	5	—	—
Turn-On Delay	t_d	$V_{CC} = 250\text{V}, I_C = 200\text{A}$	—	—	300	ns
Resistive Load Rise Time	t_r	$I_{B1} = -I_{B2} = 30\text{A}$	—	—	1.4	μs
Switch Times Storage Time	t_s	$t_p = 50 \mu\text{s}$	—	—	5	μs
Fall Time	t_f	Duty Cycle < 2%	—	—	0.75	μs

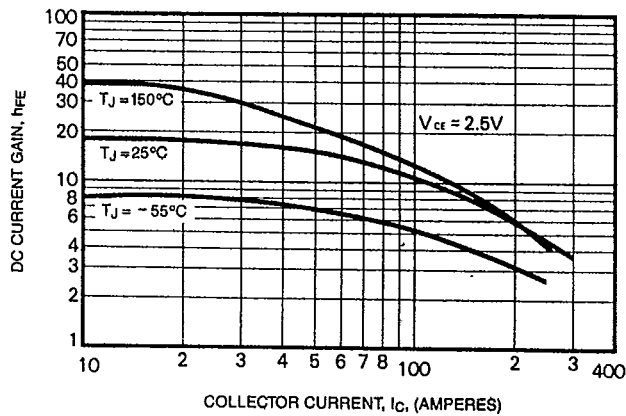


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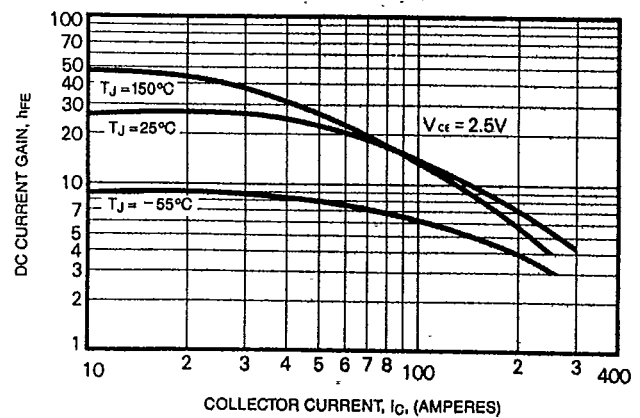
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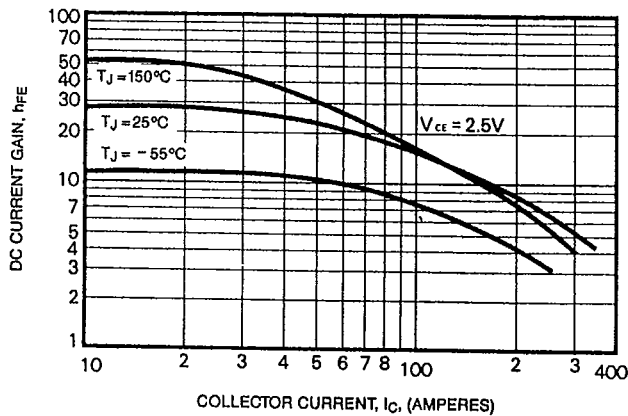
DC CURRENT GAIN (TYPICAL)
D7ST ___10



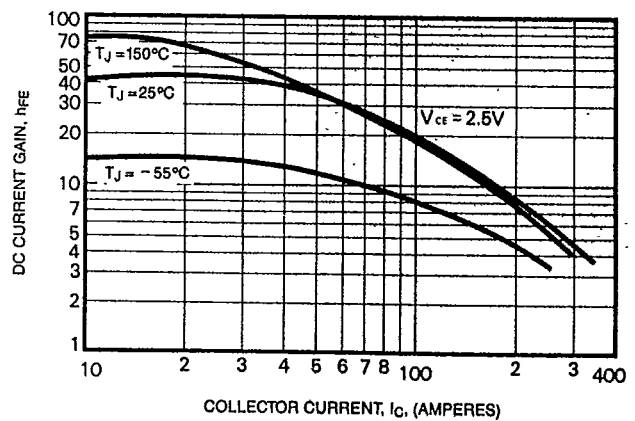
DC CURRENT GAIN (TYPICAL)
D7ST ___13



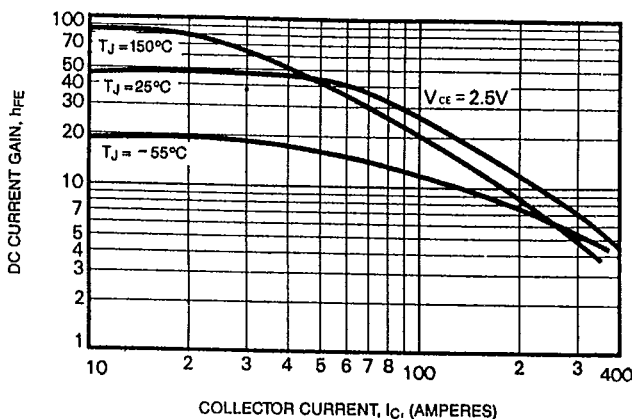
DC CURRENT GAIN (TYPICAL)
D7ST ___15



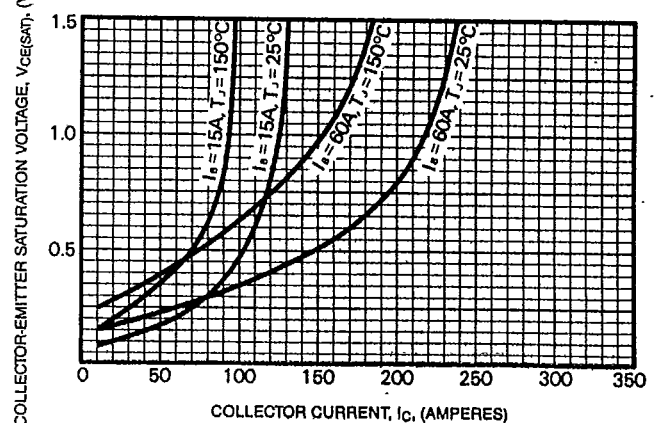
DC CURRENT GAIN (TYPICAL)
D7ST ___17



DC CURRENT GAIN (TYPICAL)
D7ST ___20



SATURATION VOLTAGE (TYPICAL)
D7ST ___10



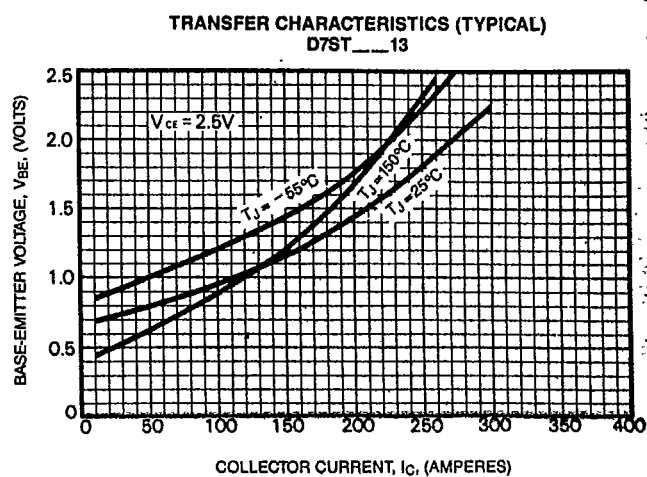
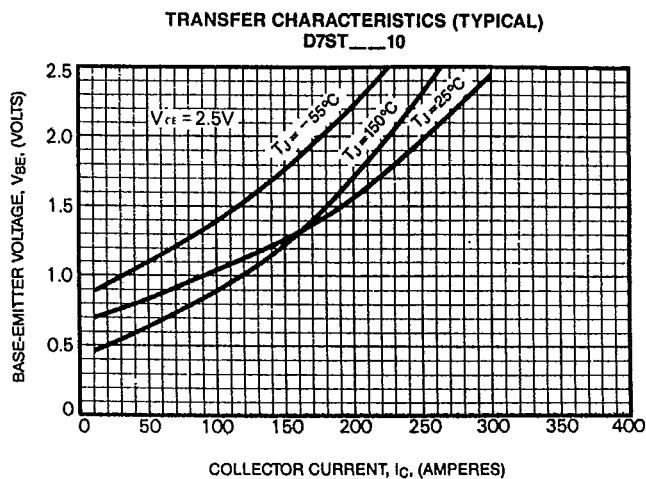
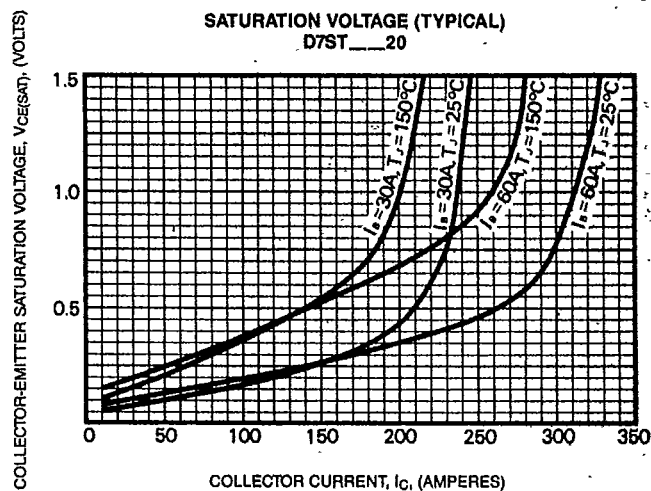
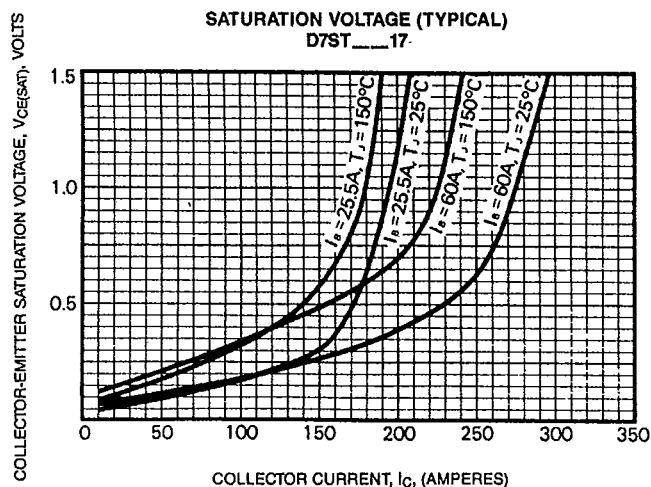
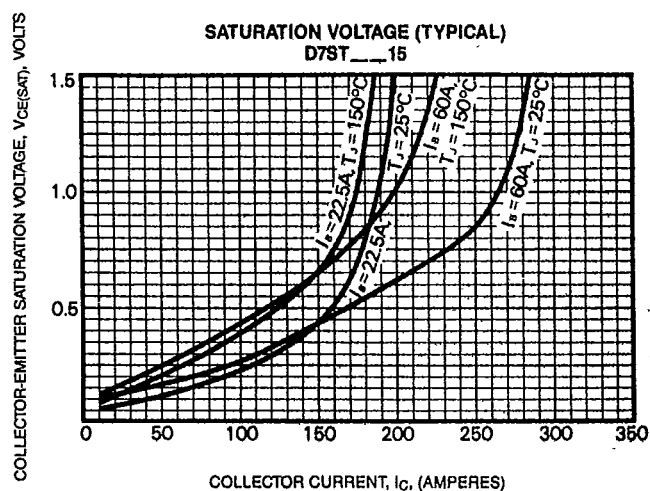
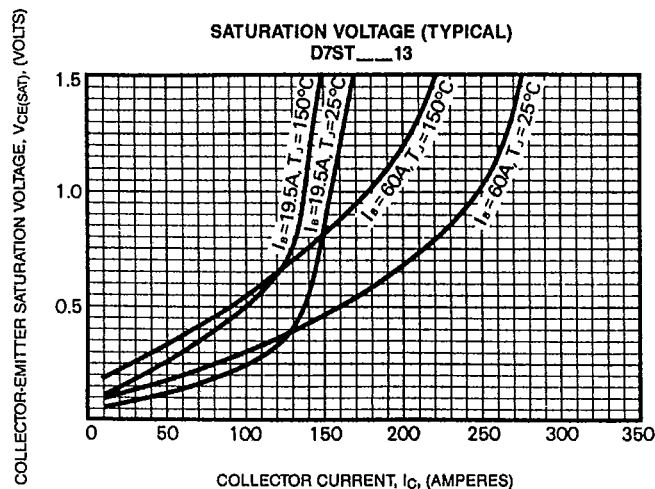


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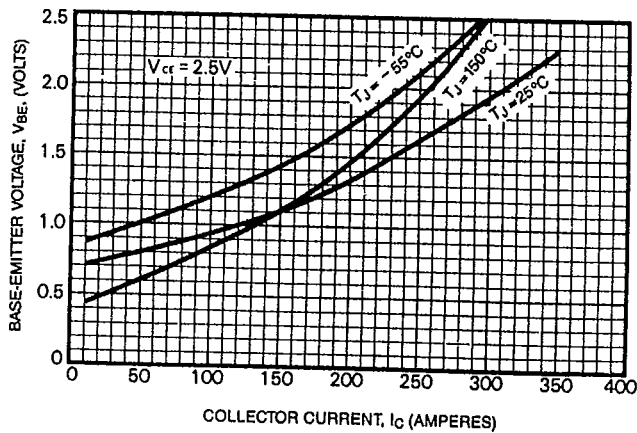


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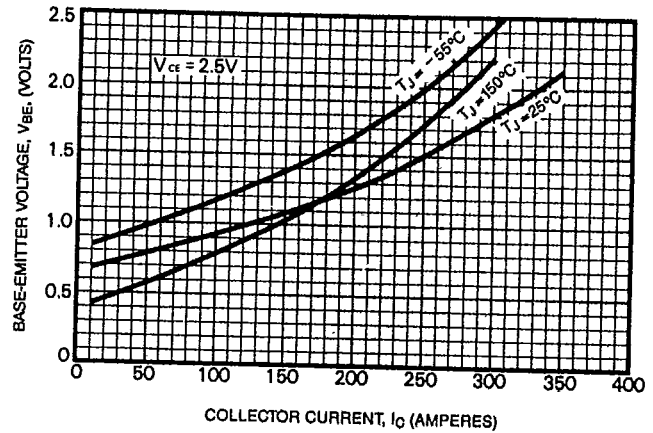
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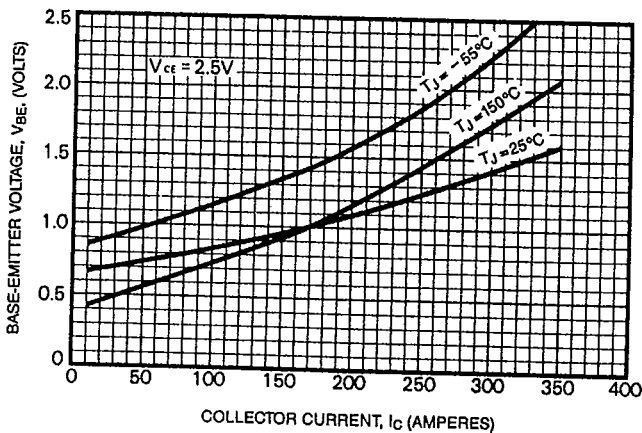
TRANSFER CHARACTERISTICS (TYPICAL)
D7ST___15



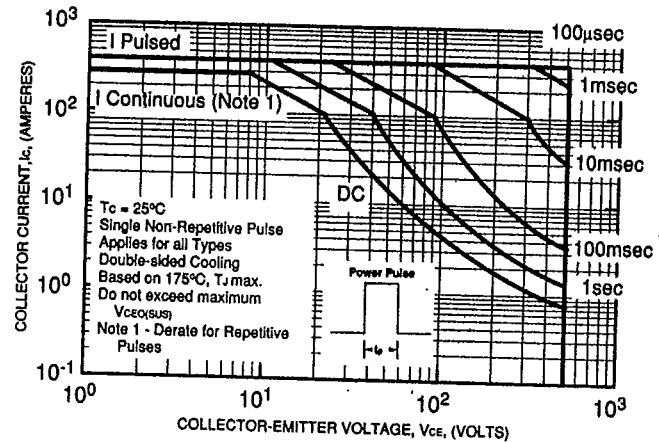
TRANSFER CHARACTERISTICS (TYPICAL)
D7ST___17



TRANSFER CHARACTERISTICS (TYPICAL)
D7ST___20



FORWARD BIAS SAFE OPERATING AREA (S.O.A.)
D7ST



TRANSIENT THERMAL IMPEDANCE VS TIME
D7ST

