



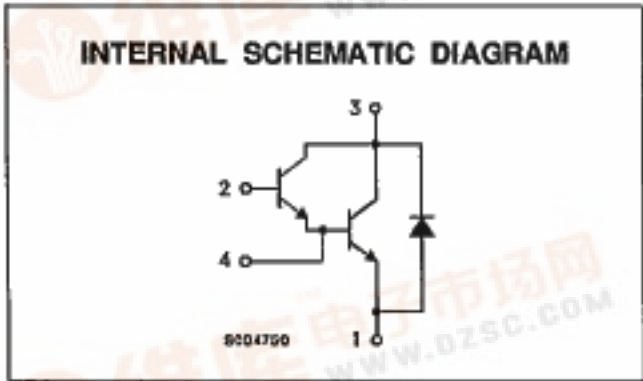
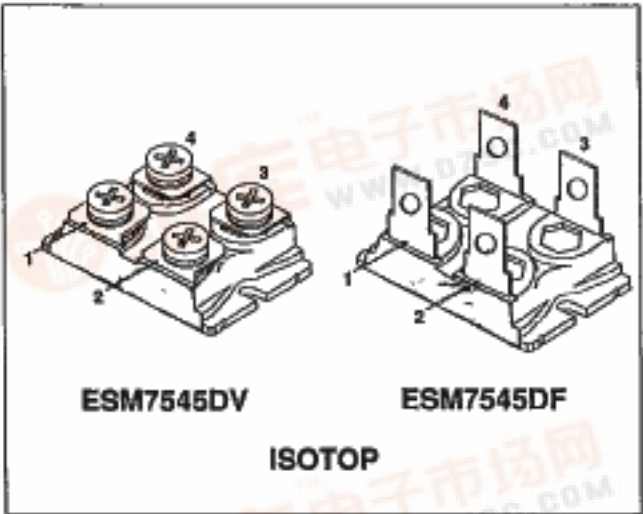
ESM7545DF
ESM7545DV

T.33-35 S G S-THOMSON
NPN DARLINGTON POWER MODULE

- HIGH CURRENT POWER BIPOLAR MODULE
- VERY LOW R_{th} JUNCTION CASE
- SPECIFIED ACCIDENTAL OVERLOAD AREAS
- ULTRAFAST FREEWHEELING DIODE
- ISOLATED CASE (2500V RMS)
- EASY TO MOUNT
- LOW INTERNAL PARASITIC INDUCTANCE

INDUSTRIAL APPLICATIONS:

- MOTOR CONTROL
- SMPS & UPS
- WELDING EQUIPMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-Emitter Voltage ($V_{BE} = -5\text{ V}$)	600	V
$V_{CE0(sus)}$	Collector-Emitter Voltage ($I_B = 0$)	450	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	7	V
I_C	Collector Current	75	A
I_{CM}	Collector Peak Current ($t_p = 10\text{ ms}$)	112	A
I_B	Base Current	5	A
I_{BM}	Base Peak Current ($t_p = 10\text{ ms}$)	7	A
P_{tot}	Total Dissipation at $T_c = 25\text{ }^\circ\text{C}$	250	W
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	150	$^\circ\text{C}$
V_{iso}	Insulation Withstand Voltage (AC-RMS)	2500	V



THERMAL DATA

T-33-35

$R_{thj-case}$	Thermal Resistance Junction-case (transistor)	Max	0.5	$^{\circ}C/W$
$R_{thj-case}$	Thermal Resistance Junction-case (diode)	Max	1.1	$^{\circ}C/W$
R_{thc-h}	Thermal Resistance Case-heat-sink With Conductive Grease Applied	Max	0.05	$^{\circ}C/W$

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER} \#$	Collector Cut-off Current ($R_{BE} = 5 \Omega$)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_J = 100^{\circ}C$			2 25	mA mA
$I_{CEV} \#$	Collector Cut-off Current ($V_{BE} = -5$)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV} \quad T_J = 100^{\circ}C$			2 25	mA mA
$I_{EBO} \#$	Emitter Cut-off Current ($I_C = 0$)	$V_{EB} = 5 V$			200	mA
$V_{CE0(sus)}^*$	Collector-Emitter Sustaining Voltage	$I_C = 0.2 A \quad L = 25 mH$ $V_{olamp} = 450 V$	450			V
h_{FE}^*	DC Current Gain	$I_C = 75 A \quad V_{CE} = 5 V$		500		
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 50 A \quad I_B = 1 A$ $I_C = 50 A \quad I_B = 1 A \quad T_J = 100^{\circ}C$ $I_C = 75 A \quad I_B = 1.5 A$ $I_C = 75 A \quad I_B = 1.5 A \quad T_J = 100^{\circ}C$		1.3 1.5 1.5 2.5	2.7 5	V V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 50 A \quad I_B = 1 A$ $I_C = 50 A \quad I_B = 1 A \quad T_J = 100^{\circ}C$ $I_C = 75 A \quad I_B = 1.5 A$ $I_C = 75 A \quad I_B = 1.5 A \quad T_J = 100^{\circ}C$		2 1.9 2.3 2.4	2.6 3.8	V V V V
di_C/dt	Rate of Rise of On-state Collector	$V_{CC} = 300 V \quad R_C = 0 \quad t_p = 3 \mu s$ $I_{B1} = 1.5 A \quad T_J = 100^{\circ}C$	300			A/ μs
$V_{CE(3 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V \quad R_C = 4 \Omega$ $I_{B1} = 1.5 A \quad T_J = 100^{\circ}C$		6	9	V
$V_{CE(5 \mu s)}$	Collector-Emitter Dynamic Voltage	$V_{CC} = 300 V \quad R_C = 4 \Omega$ $I_{B1} = 1.5 A \quad T_J = 100^{\circ}C$		3.6	6	V
t_s	Storage Time	$I_C = 75 A \quad V_{CC} = 50 V$		5	8	μs
t_f	Fall Time	$I_{B1} = 1.5 A \quad I_{B2} = -4 A$		0.8	1.5	μs
t_c	Cross-over Time	$V_{olamp} = 400 V \quad R_{BB} = 0.3 \Omega$ $L = 50 \mu H \quad T_J = 100^{\circ}C$				μs
V_{CEW}	Maximum Collector Emitter Voltage Without Snubber	$I_{CWOFF} = 75 A \quad I_{B1} = 1.5 A$ $V_{CC} = 50 V \quad I_{B2} = -4 A$ $L = 50 \mu H \quad R_{BB} = 0.3 \Omega$ $T_J = 125^{\circ}C$	450			V
V_F^*	Diode Forward Voltage	$I_F = 75 A \quad T_J = 100^{\circ}C$			2	V
I_{RM}	Reverse Recovery Current	$V_{CC} = 200 V \quad I_F = 30 A$ $di_F/dt = 375 A/\mu s \quad L < 50 nH$ $T_J = 100^{\circ}C$			45	A

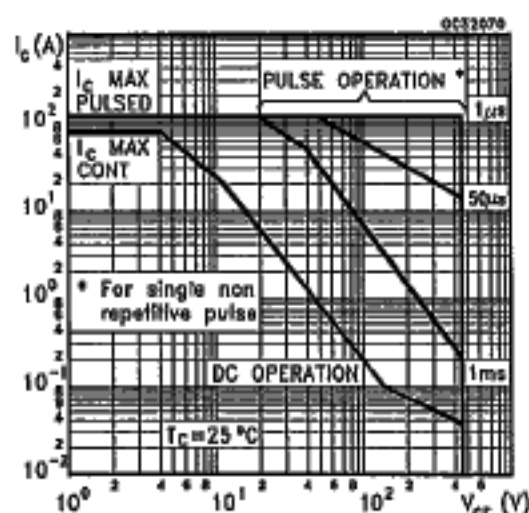
* Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

To evaluate the conduction losses of the diode use the following equations:

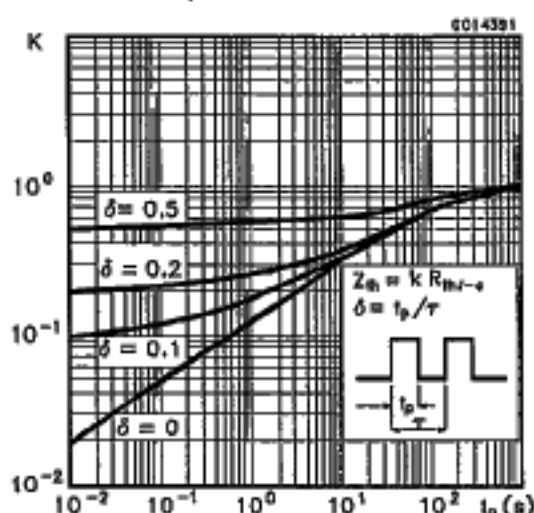
$$V_F = 0.66 + 0.0034 I_F \quad P = 0.66 I_F(\mu A) + 0.0034 I_F^2(RMS)$$

See test circuits in databook introduction

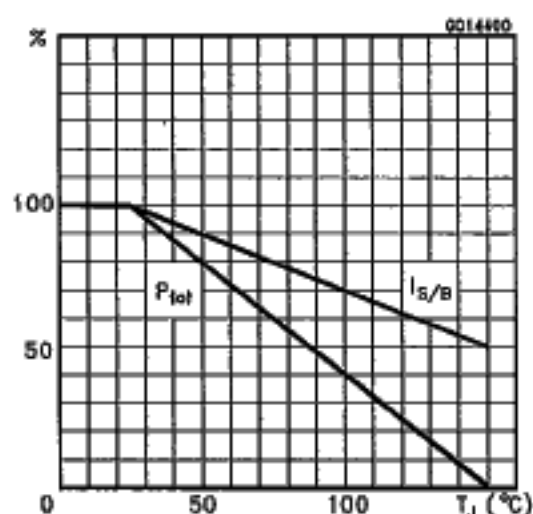
Safe Operating Areas



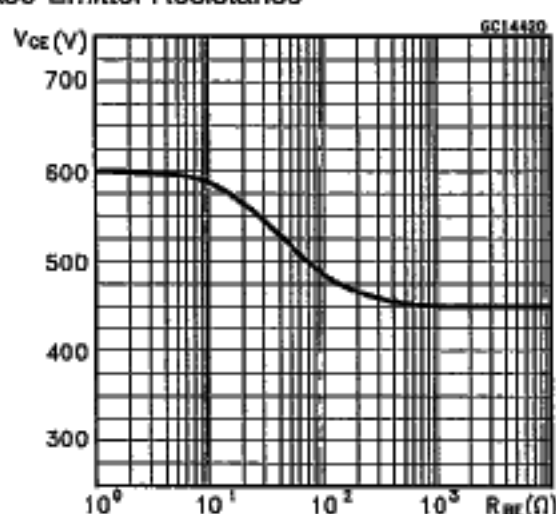
Thermal Impedance



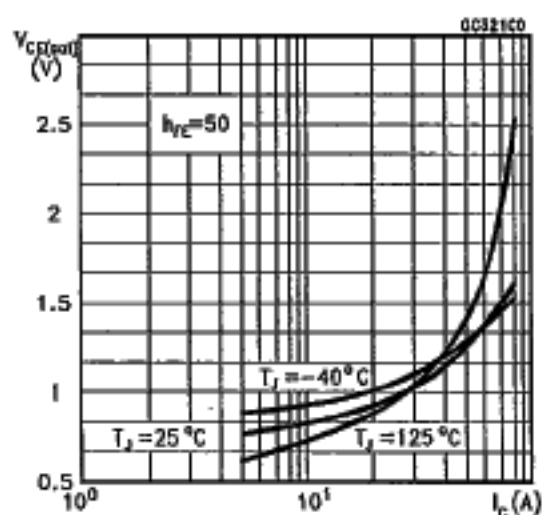
Derating Curve



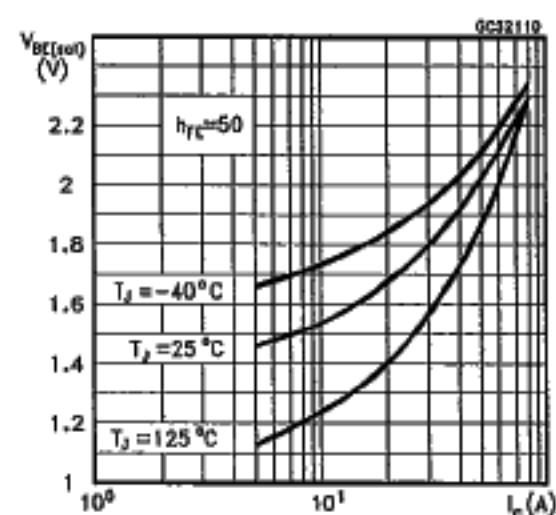
Collector-Emitter Voltage Versus Base-Emitter Resistance



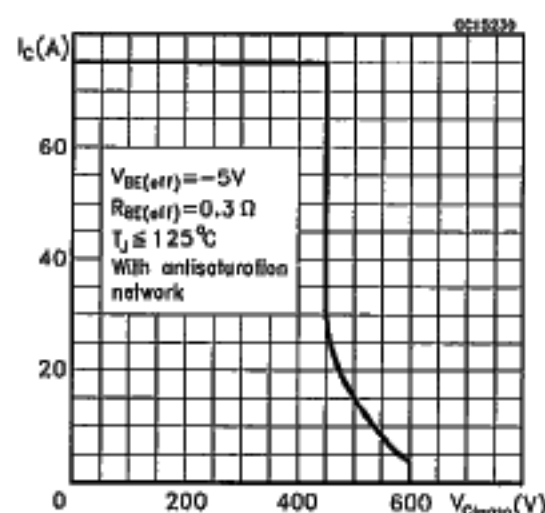
Collector-Emitter Saturation Voltage



Base-Emitter Saturation Voltage

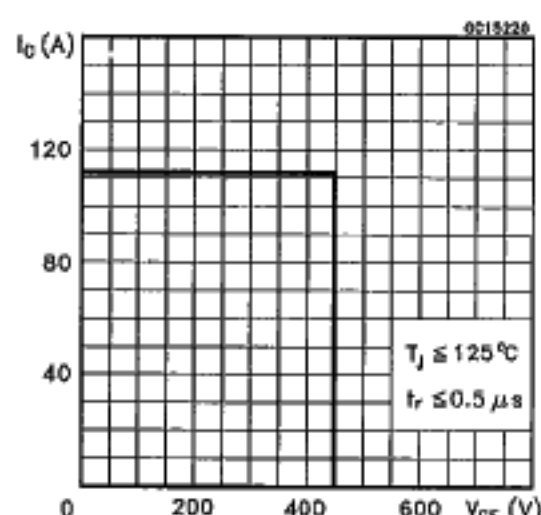


Reverse Biased SOA

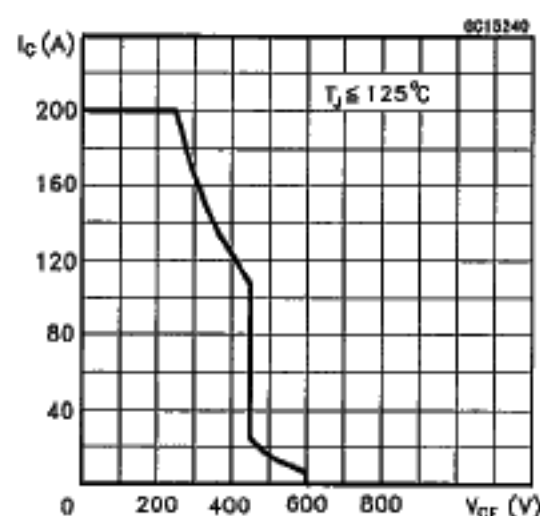


Forward Biased SOA

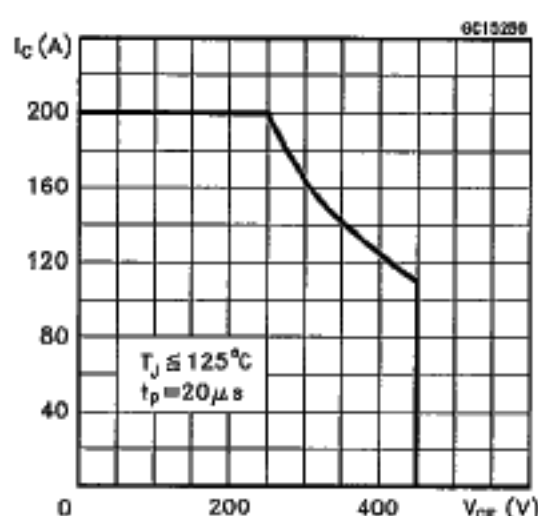
T-33-35



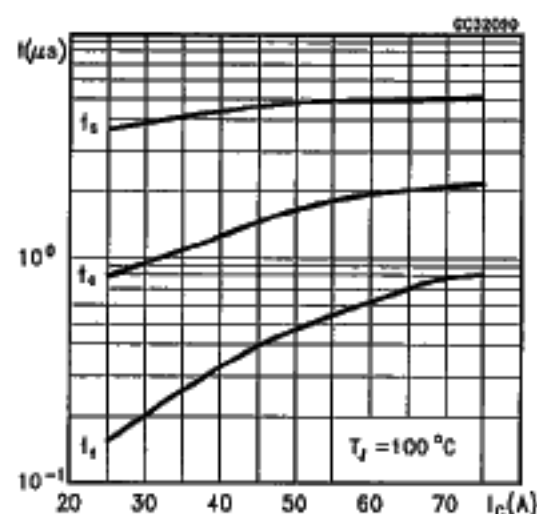
Reverse Biased AOA



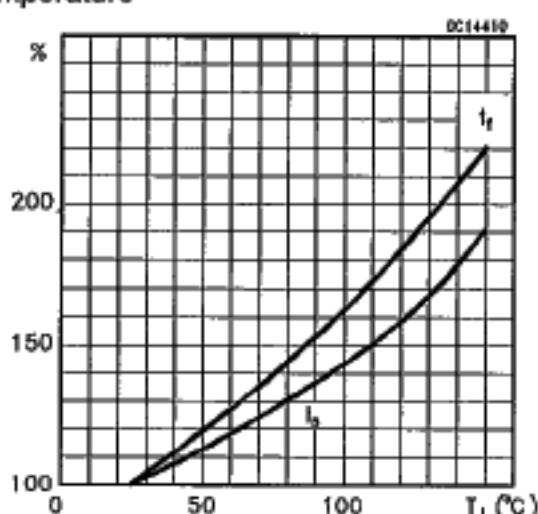
Forward Biased AOA



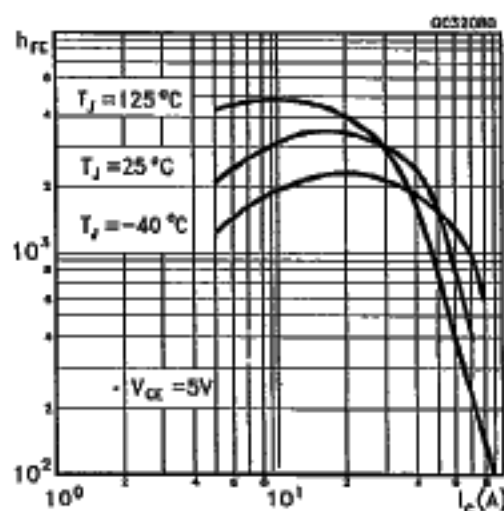
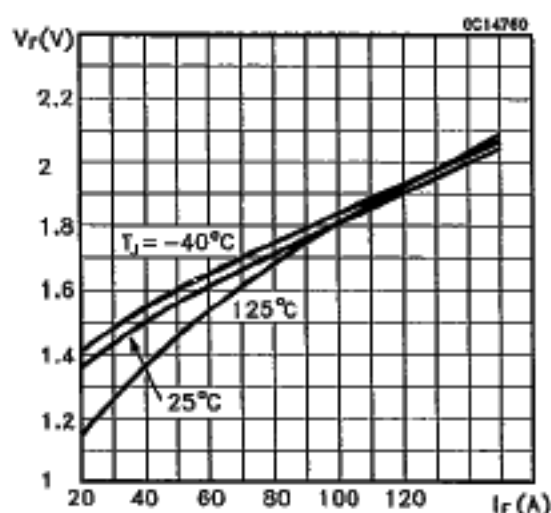
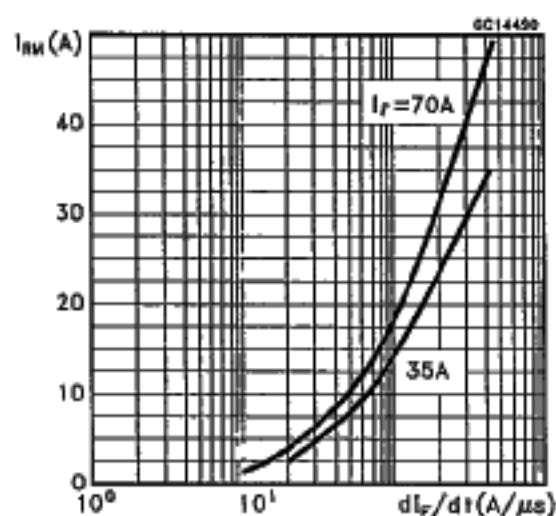
Switching Times Inductive Load



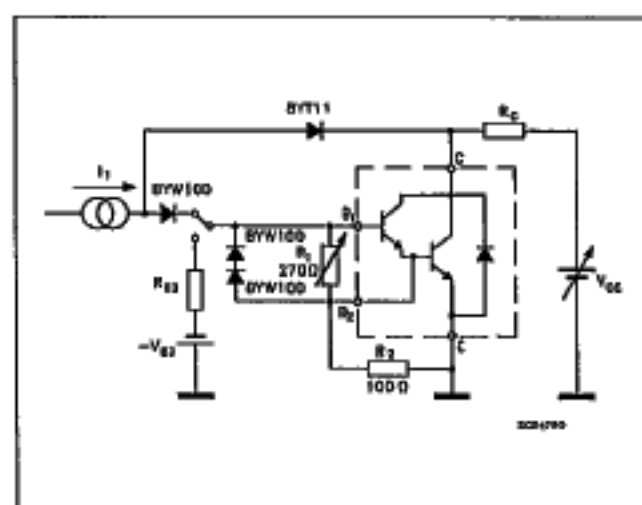
Switching Times Inductive Load Versus Temperature



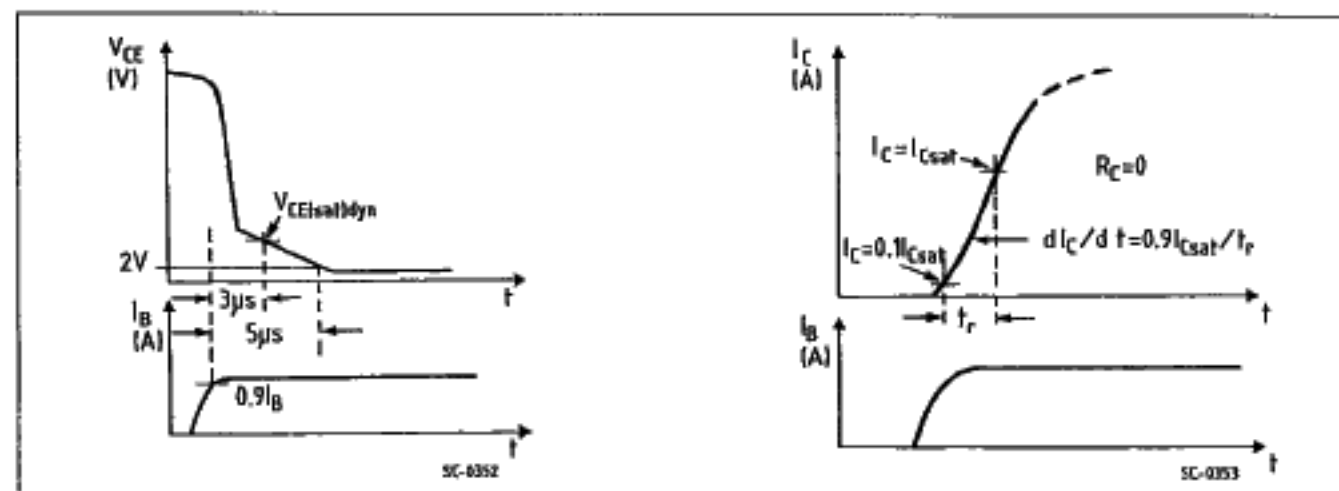
DC Current Gain

Typical V_F Versus I_F Peak Reverse Current Versus di_F/dt 

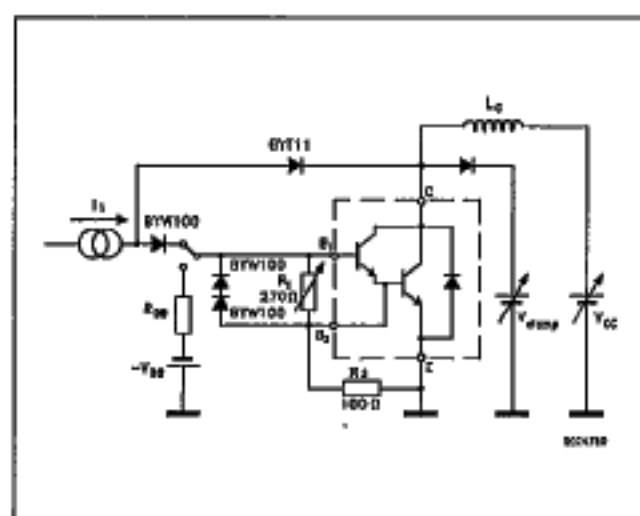
Turn-on Switching Test Circuit



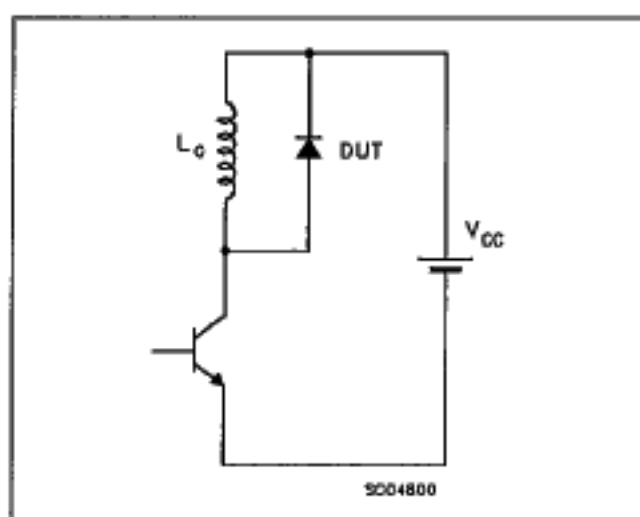
Turn-on Switching Waveforms



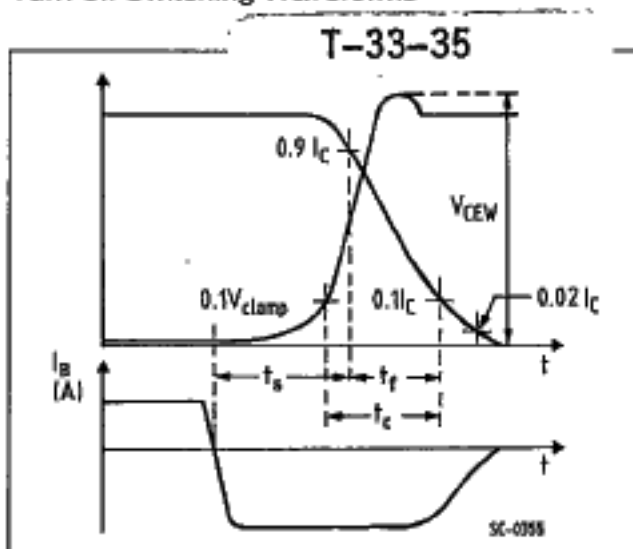
Turn-off Switching Test Circuit



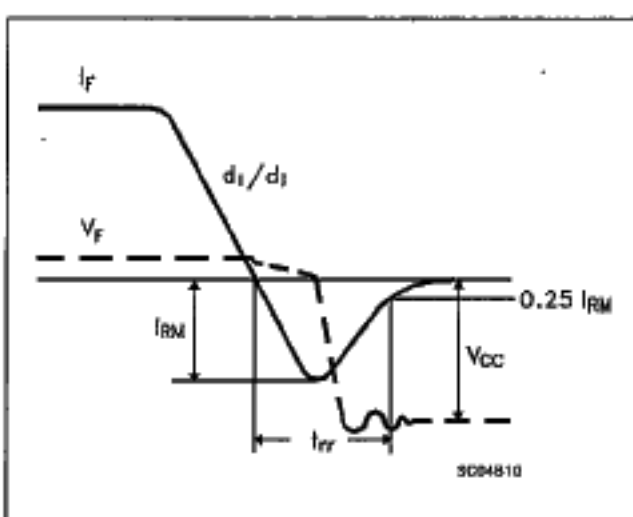
Turn-off Switching Test Circuits of Diode

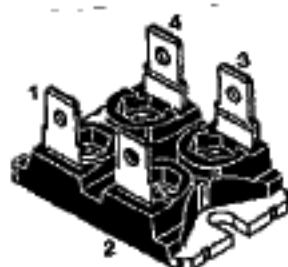


Turn-off Switching Waveforms



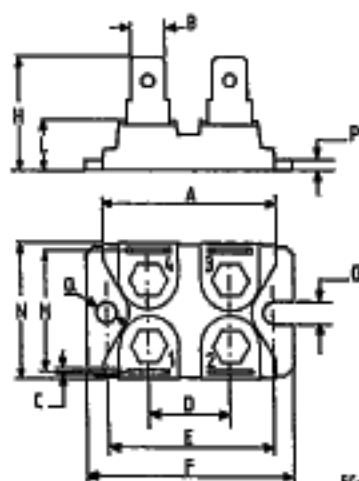
Turn-off Switching Waveform of Diode





ISOTOP
Fast-on version
sales types with the suffix F

MECHANICAL DATA



FC-0308

	DIMENSIONS			
	mm		Inches	
	min.	max.	min.	max.
A	31.5	31.7	1.240	1.248
B	6.2	6.4	0.244	0.252
C	0.75	0.85	0.029	0.033
D	14.9	15.1	0.586	0.590
E	30.1	30.3	1.185	1.193
F	38	38.2	1.496	1.503
G	4	—	0.157	—
H	20.3	20.7	0.799	0.815
L	8.9	9.1	0.350	0.358
M	22.4	23	0.881	0.905
N	25.2	25.4	0.992	1.000
P	1.95	2.05	0.076	0.080
Q	4	—	0.157	—

PIN CONNECTIONS

MOSFET

pin 1: Source pin 2: Gate
pin 3: Drain pin 4: Source sensing

DARLINGTON

pin 1: Emitter pin 2: Base1
pin 3: Collector pin 4: Base 2

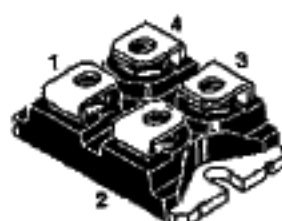
TRANSISTOR

pin 1: Emitter pin 2: Base
pin 3: Collector pin 4: Emitter sensing

Torque: Mounting 1.3 ± 0.2 N · m (max)

Weight: Package 25.5 g

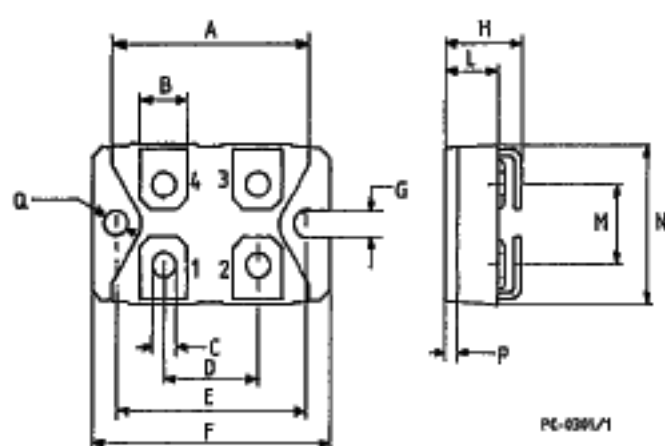
Note: The mechanical data are the same for the 3 pin version
(4th pin missing)



T-91-20

ISOTOP
Screw version
sales types with the suffix V

MECHANICAL DATA



PC-0289/L1

	DIMENSIONS			
	mm		Inches	
	min.	max	min.	max
A	31.5	31.7	1.240	1.248
B	7.8	8.2	0.307	0.322
C	4.1	4.3	0.161	0.169
D	14.9	15.1	0.586	0.590
E	30.1	30.3	1.185	1.193
F	38	38.2	1.496	1.503
G	4	—	0.157	—
H	11.8	12.2	0.464	0.480
L	8.9	9.1	0.350	0.358
M	12.6	12.8	0.496	0.503
N	25.2	25.4	0.992	1.000
P	1.95	2.05	0.076	0.080
Q	4	—	0.157	—

PIN CONNECTIONS

MOSFET

pin 1: Source pin 2: Gate
pin 3: Drain pin 4: Source sensing

DARLINGTON

pin 1: Emitter pin 2: Base1
pin 3: Collector pin 4: Base 2

TRANSISTOR

pin 1: Emitter pin 2: Base
pin 3: Collector pin 4: Emitter sensing

Torque: Terminal $1.3 \pm 0.2 \text{ N} \cdot \text{m}$ (max)
Mounting $1.3 \pm 0.2 \text{ N} \cdot \text{m}$ (max)

Weight: Package 29 g
4 Screws: 7.5 g

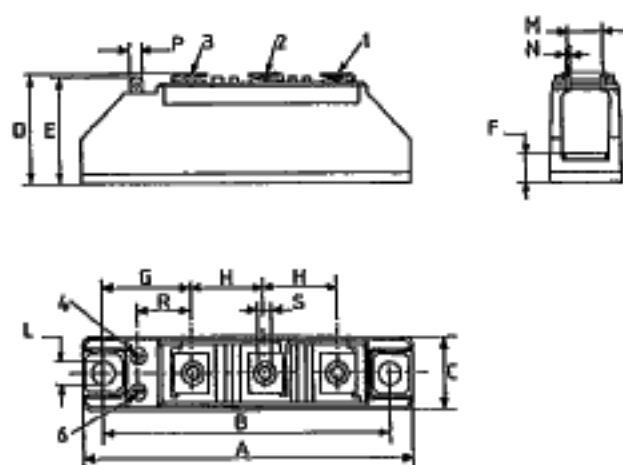
Note: The mechanical data are the same for the 3 pin version
(4th pin missing)

T-91-20

TRANSPACK (TO-240)



MECHANICAL DATA



PC-0154

	DIMENSIONS			
	mm		inches	
	min.	max	min.	max
A	91.5	92.5	3.602	3.641
B	79.75	80.25	3.140	3.160
C	19.5	20.55	0.767	0.809
D	29.00	31.00	1.141	1.220
E	28.8	30	1.134	1.181
F	8.5 typ.		0.334 typ.	
G	24.4 typ.		0.960 typ.	
H	19.5	20.5	0.767	0.807
L	6.2 typ.		0.244 typ.	
M	8.95	11.05	0.352	0.435
N	0.78	0.84	0.030	0.033
P	2.72	2.87	0.107	0.113
R	14	—	0.551	—
S	M5			

Torque: Terminal $2.2 \pm 0.5 \text{ N} \cdot \text{m}$ (max)
Mounting $3.5 \pm 0.5 \text{ N} \cdot \text{m}$ (max)

Weight: Package 110 g
Accessory 21 g

Note: The mechanical data are the same for the 2 power pin version (either pin 1 or pin 2 missing)