SGS-THOMSON MICROELECTRONICS

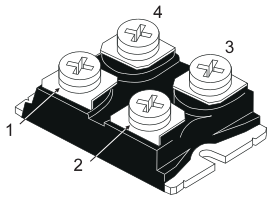
ESM4045DV

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

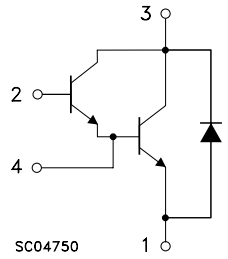
APPLICATIONS:

- MOTOR CONTROL
- SMPS & UPS
- DC/DC & DC/AC CONVERTERS
- WELDING EQUIPMENT



ISOTOP

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-Emitter Voltage (V_{BE} = -5 V)	600	V
$V_{CEO(sus)}$	Collector-Emitter Voltage (I_B = 0)	450	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	7	V
I_C	Collector Current	42	A
I_{CM}	Collector Peak Current (t_p = 10 ms)	63	A
I_B	Base Current	4	A
I_{BM}	Base Peak Current (t_p = 10 ms)	8	A
P_{tot}	Total Dissipation at T_c = 25 °C	150	W
T_{stg}	Storage Temperature	-55 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C
V_{ISO}	Insulation Withstand Voltage (AC-RMS)	2500	°C

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case (transistor)	Max	0.83	°C/W
$R_{thj\text{-}case}$	Thermal Resistance Junction-case (diode)	Max	1.5	°C/W
$R_{thc\text{-}h}$	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER} #	Collector Cut-off Current (R_{BE} = 5 Ω)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ T_j = 100 °C			1.5 20	mA mA
I_{CEV} #	Collector Cut-off Current (V_{BE} = -5)	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ T_j = 100 °C			1 13	mA mA
I_{EBO} #	Emitter Cut-off Current (I_C = 0)	V_{EB} = 5 V			1	mA
$V_{CEO(SUS)}$*	Collector-Emitter Sustaining Voltage	I_C = 0.2 A L = 25 mH V_{clamp} = 450 V	450			V
h_{FE}*	DC Current Gain	I_C = 35 A V_{CE} = 5 V		220		
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 25 A I_B = 0.5 A I_C = 25 A I_B = 0.5 A T_j = 100 °C I_C = 35 A I_B = 2 A I_C = 35 A I_B = 2 A T_j = 100 °C		1.15 1.3 1.4 1.5	 2 2	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 35 A I_B = 2 A I_C = 35 A I_B = 2 A T_j = 100 °C		2.3 2.3	 3	V V
dI_C/dt	Rate of Rise of On-state Collector	V_{CC} = 300 V R_C = 0 t_p = 3 µs I_{B1} = 0.75 A T_j = 100 °C	200	250		A/µs
V_{CE}(3 µs)	Collector-Emitter Dynamic Voltage	V_{CC} = 300 V R_C = 12 Ω I_{B1} = 0.75 A T_j = 100 °C		4.5	8	V
V_{CE}(5 µs)	Collector-Emitter Dynamic Voltage	V_{CC} = 300 V R_C = 12 Ω I_{B1} = 0.75 A T_j = 100 °C		2.5	4.5	V
t_s t_f t_c	Storage Time Fall Time Cross-over Time	I_C = 25A V_{CC} = 50 V V_{BB} = -5 V R_{BB} = 0.6 Ω V_{clamp} = 450 V I_{B1} = 0.5 A L = 0.1 mH T_j = 100 °C		3.2 0.25 0.75	5 0.5 1.5	µs µs µs
V_{CEW}	Maximum Collector Emitter Voltage Without Snubber	I_{CWoff} = 42 A I_{B1} = 2 A V_{BB} = -5 V V_{CC} = 50 V L = 0.06 mH R_{BB} = 0.6 Ω T_j = 125 °C	450			V
V_F*	Diode Forward Voltage	I_F = 35 A T_j = 100 °C		1.5	1.85	V
I_{RM}	Reverse Recovery Current	V_{CC} = 200 V I_F = 35 A di_F/dt = -200 A/µs L < 0.05 µH T_j = 100 °C		20	24	A

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

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

$V_F = 1.5 + 0.001\ I_F$ $P = 1.5\ I_{F(AV)} + 0.001\ I^2_{F(RMS)}$

See test circuits in databook introduction