SGS-THOMSON MICROELECTRONICS

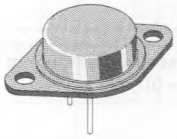
2N5038/39 2N6496

HIGH CURRENT POWER SWITCH

DESCRIPTION

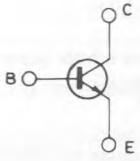
The 2N5038, 2N5039 and 2N6496 are silicon planar multiepitaxial NPN transistors in Jedec TO-3 metal case.

They are especially intended for high current and fast switching applications.



TO-3

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	2N5038	2N5039	2N6496	Unit
V_{CBO}	Collector-base Voltage (I_E = 0)	150	120	150	V
V_{CEX}	Collector-emitter Voltage (V_{BE} = – 1.5 V, R_{BE} = 100 Ω)	150	120	150	V
V_{CER}	Collector-emitter Voltage (R_{BE} ≤ 50 Ω)	110	95	130	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	90	75	110	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	7	7	7	V
I_C	Collector Current	20	20	15	V
I_{CM}	Collector Peak Current	30	30		V
I_B	Base Current	5			A
P_{tot}	Total Power Dissipation at T_{case} ≤ 25 °C	140			W
T_{stg}	Storage Temperature	– 65 to 200			°C
T_j	Junction Temperature	200			°C

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	1.25	°C/W

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

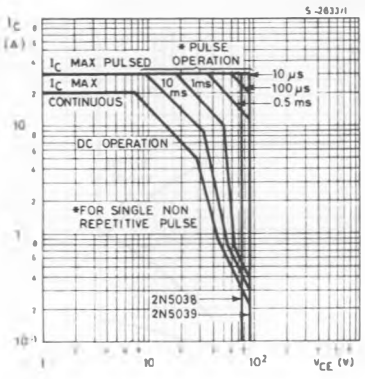
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cutoff Current (V_{BE} = – 1.5 V)	for **2N5038**				
		V_{CE} = 140 V			50	mA
		V_{CE} = 100 V T_{case} = 150 °C			10	mA
		for **2N5039**				
		V_{CE} = 110 V			50	mA
		V_{CE} = 85 V T_{case} = 150 °C			10	mA
		for **2N6496**				
		V_{CE} = 130 V			20	mA
		V_{CE} = 130 V T_{case} = 150 °C			25	mA
I_{CEO}	Collector Cutoff Current (I_B = 0)	for **2N5038**				
		V_{CE} = 70 V			20	mA
		for **2N5039**				
		V_{CE} = 55 V			20	mA
I_{EBO}	Emitter Cutoff Current (I_C = 0)	V_{EB} = 7 V			50	mA
		V_{EB} = 5 V				
		for **2N5038**			5	mA
		for **2N5039**			15	mA
$V_{CEX(sus)}$*	Collector-emitter Sustaining Voltage (V_{BE} = – 1.5 V, R_{BE} = 100 Ω)	I_C = 200 mA				
		for **2N5038**	150			V
		for **2N5039**	120			V
		for **2N6496**	150			V
$V_{CER(sus)}$*	Collector-emitter Sustaining Voltage (R_{BE} = 50 Ω)	I_C = 200 mA				
		for **2N5038**	110			V
		for **2N5039**	95			V
		for **2N6496**	130			V
$V_{CEO(sus)}$*	Collector-emitter Sustaining Voltage (I_B = 0)	I_C = 200 mA				
		for **2N5038**	90			V
		for **2N5039**	75			V
		for **2N6496**	110			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	for **2N5038**				
		I_C = 12 A I_B = 1.2 A			1	V
		I_C = 20 A I_B = 5 A			2.5	V
		for **2N5039**				
		I_C = 10 A I_B = 1 A			1	V
		I_C = 20 A I_B = 5 A			2.5	V
		for **2N6496**				
		I_C = 8 A I_B = 0.8 A			1	V
$V_{BE(sat)}$*	Base-emitter Saturation Voltage	for **2N5038** and **2N5039**				
		I_C = 20 A I_B = 5 A			3.3	V
		for **2N6496**				
		I_C = 8 A I_B = 0.8 A			2	V
V_{BE}*	Base-emitter Voltage	for **2N5038**				
		I_C = 12 A V_{CE} = 5 V			1.8	V
		for **2N5039**				
		I_C = 10 A V_{CE} = 5 V			1.8	V
		for **2N6496**				
		I_C = 8 A V_{CE} = 2 V			1.6	V

ELECTRICAL CHARACTERISTICS (continued)

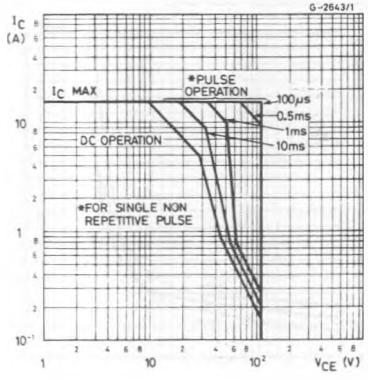
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
h_{FE}*	DC Current Gain	for **2N5038**				
		I_C = 2 A V_{CE} = 5 V	50		250	
		I_C = 12 A V_{CE} = 5 V	20		100	
		for **2N5039**				
		I_C = 2 A V_{CE} = 5 V	30		250	
		I_C = 10 A V_{CE} = 5 V	20		100	
		for **2N6496**				
		I_C = 8 A V_{CE} = 2 V	12		100	
h_{fe}	Small Signal Current Gain	I_C = 2 A V_{CE} = 10 V f = 5 MHz	12			
C_{CBO}	Collector-base Capacitance	I_E = 0 V_{CB} = 10 V f = 1 MHz			300	pF
t_r	Rise Time	for **2N5038**				
		I_C = 12 A V_{CC} = 30 V			0.5	µs
		I_{B1} = − I_{B2} = 1.2 A				
t_s	Storage Time	for **2N5039**				
		I_C = 10 A V_{CC} = 30 V			1.5	µs
		I_{B1} = − I_{B2} = 1 A				
t_f	Fall Time	for **2N6496**				
		I_C = 8 A V_{CC} = 30 V			0.5	µs
		I_{B1} = − I_{B2} = 0.8 A				
$I_{s/b}$**	Second Breakdown Collector Current	V_{CE} = 28 V	5			A
		V_{CE} = 45 V	0.9			A
$E_{s/b}$	Second Breakdown Energy	V_{BE} = − 4 V R_{BE} = 20 Ω L = 180 µH				
		for **2N5038**	13			mJ
		for **2N5039**	13			mJ
		for **2N6496**	5.7			mJ

* Pulsed : pulse duration = 300µs duty cycle = 1.5%.
** Pulsed : 1 s non repetitive pulse.

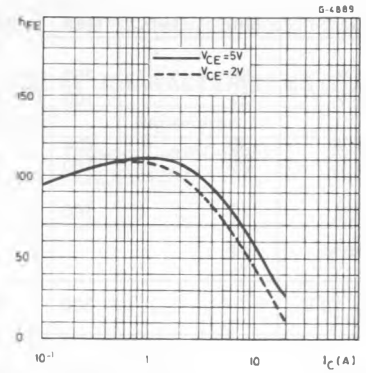
Safe Operating Areas (for **2N5038** and **2N5039**).



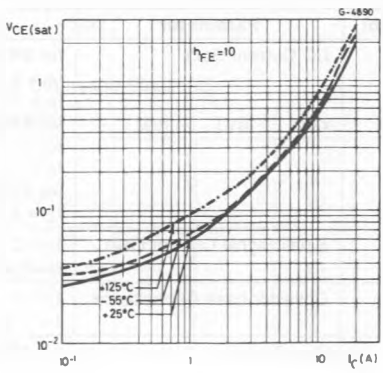
Safe Operating Areas (for **2N6496**).



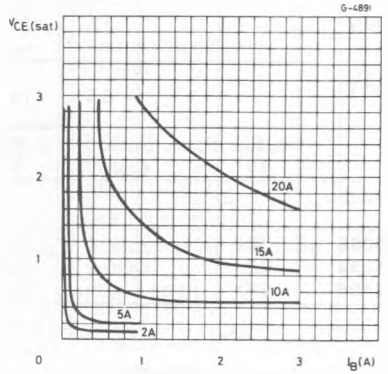
DC Current Gain.



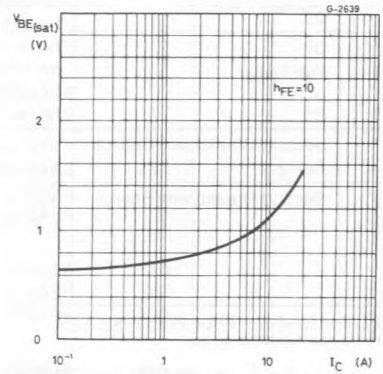
Collector-emitter Saturation Voltage.



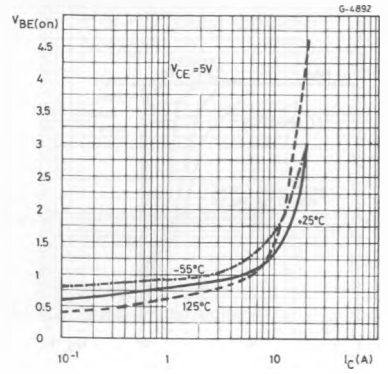
Collector-emitter Saturation Voltage.



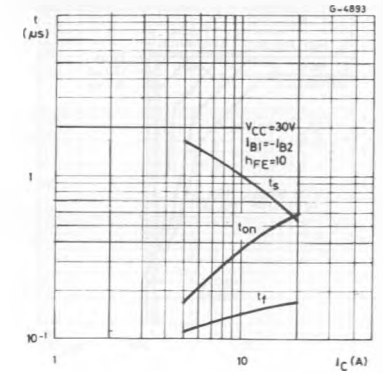
Base-emitter Saturation Voltage.



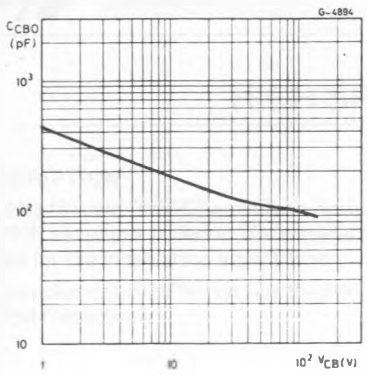
$V_{BE(on)}$ vs. Collector Current.



Saturated Switching Characteristics.



Collector-base Capacitance.



Transition Frequency.