SGSD00032
SGSD00033
SGSD00034
SGSD00035

MULTIEPITAXIAL MESA HOLLOW EMITTER NPN

ADVANCE DATA

HIGH VOLTAGE FAST SWITCHING POWER TRANSISTORS

The SGSD00032 and SGSD00034, the SGSD00033 and SGSD00035, are silicon multiepitaxial mesa hollow emitter NPN transistors respectively in TO-3 and SOT-93 packages. They are intended for high voltage and fast switching applications at 20 to 100KHz.

ABSOLUTE MAXIMUM RATINGS

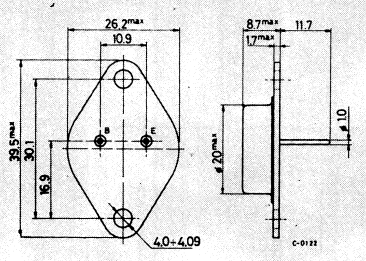
		TO-3 SOT-93	SGSD00032 SGSD00033	SGSD00034 SGSD00035
V_{CER}	Collector-emitter voltage ($R_{BE} = 10\Omega$)		700V	1000V
V_{CES}	Collector-base voltage ($V_{BE} = 0$)		700V	1000V
V_{CEX}	Collector-emitter voltage ($V_{BE} = 2.5V$)		700V	1000V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)		400V	450V
V_{EBO}	Emitter-base voltage ($I_C = 0$)		7V	
I_C	Collector current		12A	
I_{CM}	Collector peak current ($t_p < 5ms$)		20A	
I_B	Base current		4A	
I_{BM}	Base peak current ($t_p < 5ms$)		10A	
			SOT-93	**TO-3**
P_{tot}	Total dissipation at $T_{case} < 25°C$		150W	175W
T_{stg}	Storage temperature		-65 to 150°C	-65 to 200°C
T_j	Max. operating junction temperature		150°C	200°C

INTERNAL SCHEMATIC DIAGRAM

MECHANICAL DATA

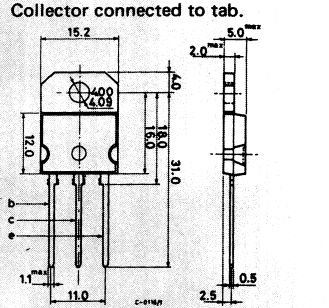
Dimensions in mm

Collector connected to case



TO-3

Collector connected to tab.



(sim. to TO-218) SOT-93

THERMAL DATA

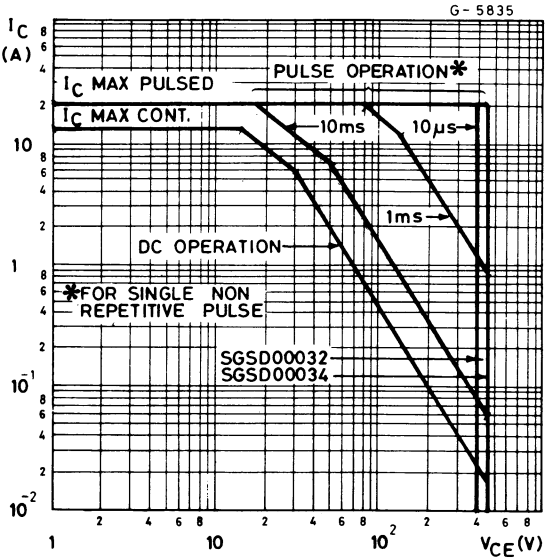
			SOT-93	TO-3
$R_{th\,j\text{-}case}$	Thermal resistance junction-case	max	0.83°C/W	1.0°C/W

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

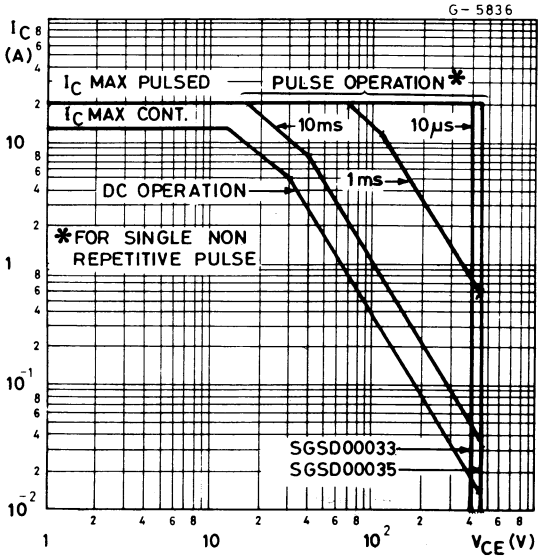
Parameter		Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector cutoff curr. (R_{BE} = 10Ω)	V_{CE} = rated V_{CER} V_{CE} = rated V_{CER} T_{case} = 125°C			500 4	μA mA
I_{CES}	Collector cutoff current (V_{BE} = 0)	V_{CE} = rated V_{CES} V_{CE} = rated V_{CES} T_{case} = 125°C			200 2	μA mA
I_{CEX}	Collector cutoff current	V_{CE} = rated V_{CEX} V_{CE} = rated V_{CEX} T_{case} = 125°C			200 2	μA mA
I_{CEO}	Collector cutoff current (I_B = 0)	V_{CE} = 300V for **SGSD00032/33** V_{CE} = 380V for **SGSD00034/35**			1 1	mA mA
I_{EBO}	Emitter cutoff current (I_C = 0)	V_{BE} = 7V			1	mA
$V_{CEO\,(sus)}$ *	Collector emitter sustaining voltage	I_C = 0.1A for **SGSD00032/33** for **SGSD00034/35**	 400 450			 V V
$V_{CE\,(sat)}$ *	Collector-emitter saturation voltage	I_C = 10A I_B = 2A for **SGSD00032/33** I_C = 8A I_B = 1.6A for **SGSD00034/35**			 1.5 1.5	 V V
$V_{BE\,(sat)}$ *	Base-emitter saturation voltage	I_C = 10A I_B = 2A for **SGSD00032/33** I_C = 8A I_B = 1.6A for **SGSD00034/35**			 1.6 1.6	 V V
h_{FE} *	DC current gain	I_C = 1A V_{CE} = 5V	15		60	
RESISTIVE LOAD						
t_{on} t_s t_f	Turn-on time Storage time Fall time	I_C = 10A V_{CC} = 150V I_{B1} = -I_{B2} = 2A		0.6 1.1 0.25	1.0 2.2 0.5	μs μs μs
t_{on} t_s t_f	Turn-on time Storage time Fall time	I_C = 10A V_{CC} = 150V 2I_{B1} = -I_{B2} = 4A		0.5 1.0 0.15	1.0 2.0 0.3	μs μs μs
INDUCTIVE LOAD						
t_s t_f	Storage time Fall time	I_C = 10A; V_{CC} = 150V; L = 200μH $V_{BE\,(off)}$ = -5V; h_{FE} = 5; T_{case} = 25°C		0.7 0.04	1.2 0.1	μs μs
t_s t_f	Storage time Fall time	I_C = 10A; V_{CC} = 150V; L = 200μH $V_{BE\,(off)}$ = -5V; h_{FE} = 5; T_{case} = 100°C		0.9 0.08	1.5 0.2	μs μs

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

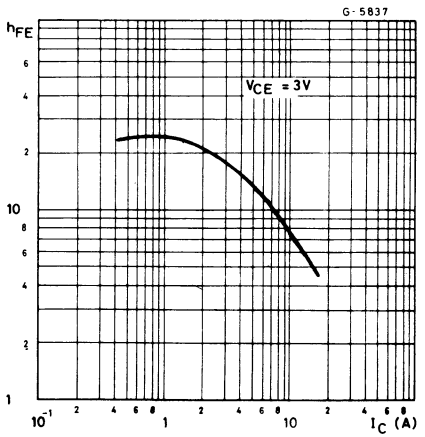
Safe operating area for SGSD00032/34



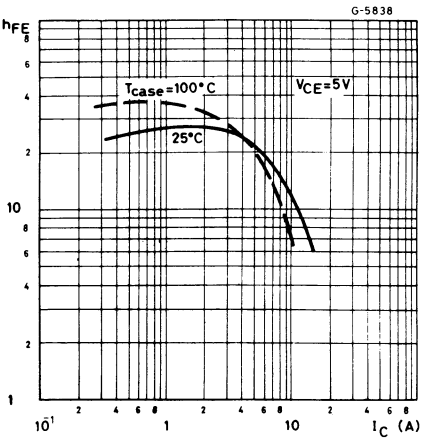
Safe operating area for SGSD00033/35



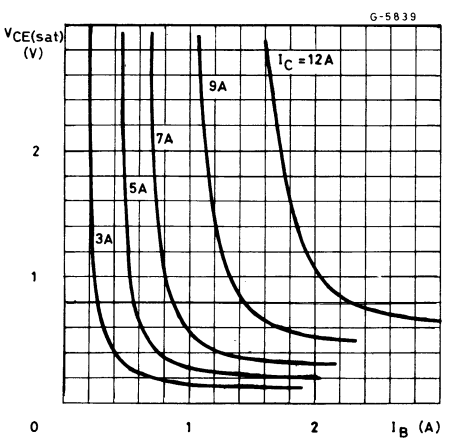
DC current gain



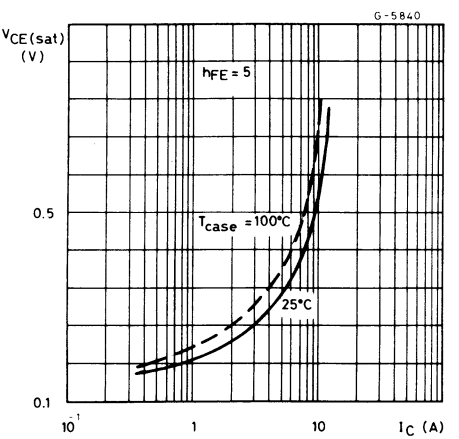
DC current gain



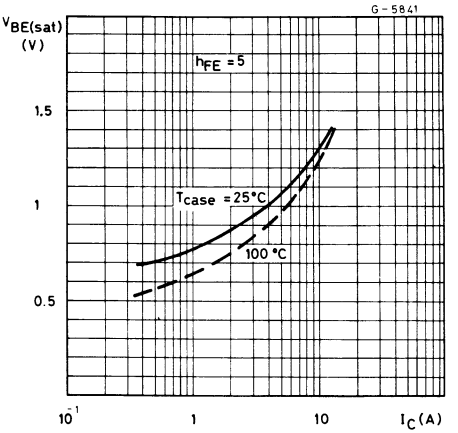
Collector-emitter saturation voltage



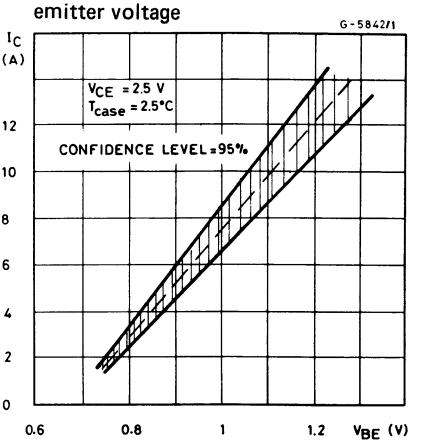
Collector-emitter saturation voltage



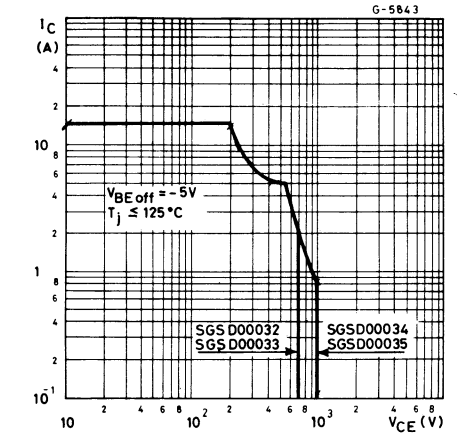
Base-emitter saturation voltage



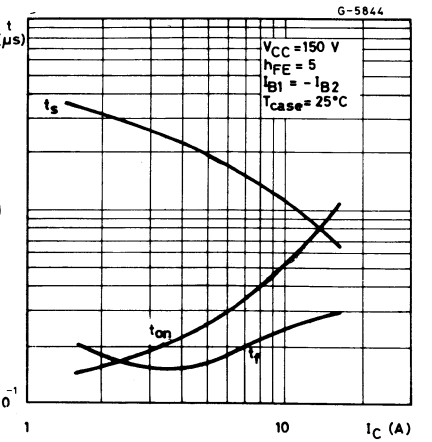
Collector current spread vs. base emitter voltage



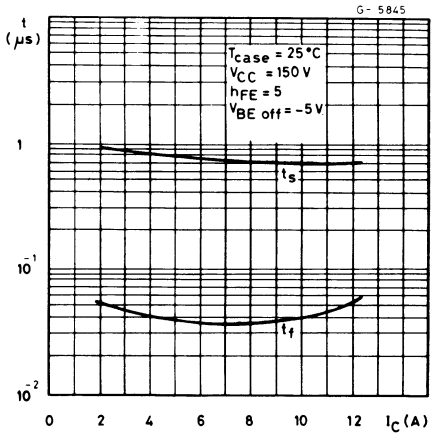
Reverse bias safe operating area



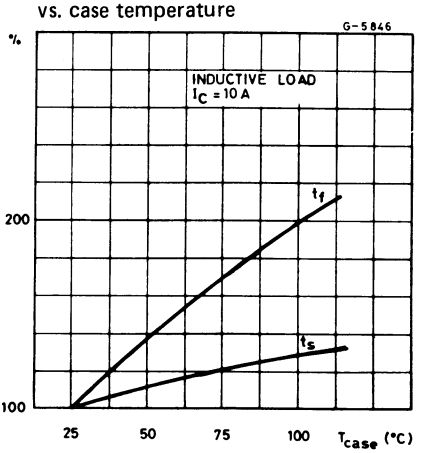
Resistive load switching times



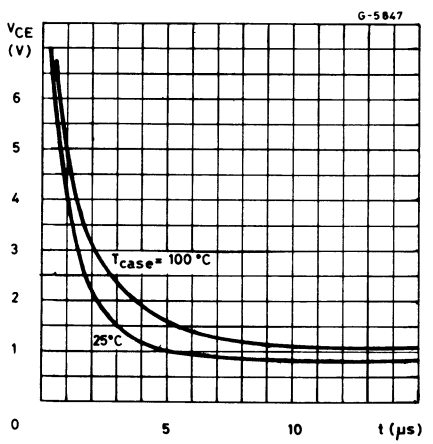
Inductive load switching times



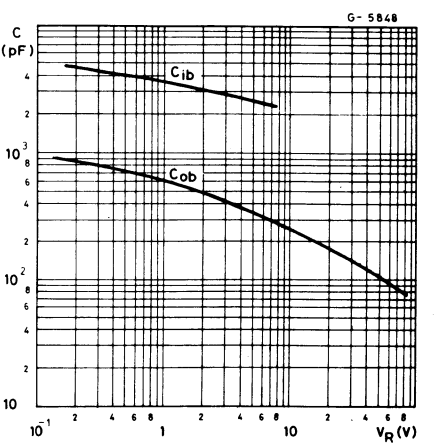
Switching times percentage variation vs. case temperature



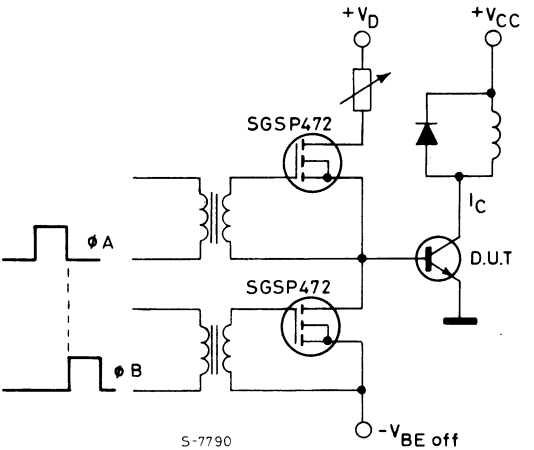
$V_{CE(sat)}$ Dynamic



Capacitance



SWITCHING TIMES TEST CIRCUIT



V_{CC} = 150V
L = 0.2mH

ϕ_A = pulse width must be adjusted to obtain desired I_C value
ϕ_B = pulse width equal to ϕ_A pulse duration

MULTIEPITAXIAL MESA HOLLOW EMITTER NPN

SGSD00036/38
SGSD00037/39
SGSD00040/41

ADVANCE DATA

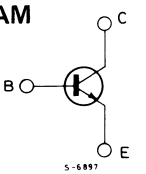
HIGH VOLTAGE FAST SWITCHING POWER TRANSISTORS

The SGSD00036 and SGSD00038, the SGSD00037 and SGSD00039, the SGSD00040 and SGSD00041, are silicon multiepitaxial mesa hollow emitter NPN transistors respectively in TO-3, SOT-93, and TO-220 packages.
They are intended for high voltage and fast switching applications at 20 to 100 KHz.

ABSOLUTE MAXIMUM RATINGS

		TO-3 SOT-93 TO-220	SGSD00036 SGSD00037 SGSD00040	SGSD00038 SGSD00039 SGSD00041
V_{CES}	Collector-base voltage ($V_{BE} = 0$)		700V	1000V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)		400V	450V
V_{EBO}	Emitter-base voltage ($I_C = 0$)		7V	
I_C	Collector current		8A	
I_{CM}	Collector peak current ($t_p <$ ms)		12A	
I_B	Base current		5A	
I_{BM}	Base peak current ($t_p < 5$ms)		10A	
			TO-220	**SOT-93**	**TO-3**
P_{tot}	Total dissipation at $T_{case} < 25°C$		90W	120W	120W
T_{stg}	Storage temperature		-65 to 150°C	-65 to 150°C	-65 to 200°C
T_j	Max. operating junction temperature		150°C	150°C	200°C

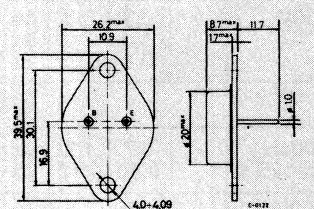
INTERNAL SHCEMATIC DIAGRAM



MECHANICAL DATA

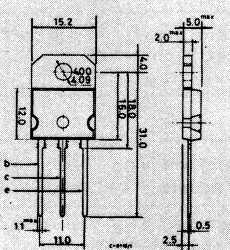
Dimensions in mm

Collector connected to case



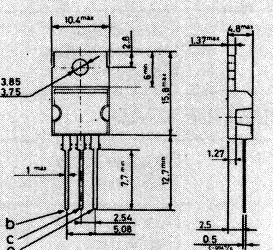
TO-3

Collector connected to tab.



(sim. to TO-218) SOT-93

Collector connected to tab.



TO-220

THERMAL DATA

			TO-3	SOT-93	TO-220
$R_{th\,j\text{-}case}$	Thermal resistance junction-case	max	1.45°C/W	1.04°C/W	1.38°C/W

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

Parameter		Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cutoff current (V_{BE} = 0)	V_{CE} = rated V_{CES}			200	μA
I_{CEO}	Collector cutoff current (I_B = 0)	V_{CE} = 300V for **SGSD00036/37/40**			1	mA
		V_{CE} = 380V for **SGSD00038/39/41**			1	mA
I_{EBO}	Emitter cutoff current (I_C = 0)	V_{BE} = 7V			1	mA
$V_{CEO\,(sus)}$ *	Collector emitter sustaining voltage	I_C = 0.1A for **SGSD00036/37/40**	400			V
		for **SGSD00038/39/41**	450			V
$V_{CE\,(sat)}$ *	Collector-emitter saturation voltage	I_C = 6A I_B = 1.2A			1.5	V
$V_{BE\,(sat)}$ *	Base-emitter saturation voltage	I_C = 6A I_B = 1.2A			1.5	V

RESISTIVE LOAD

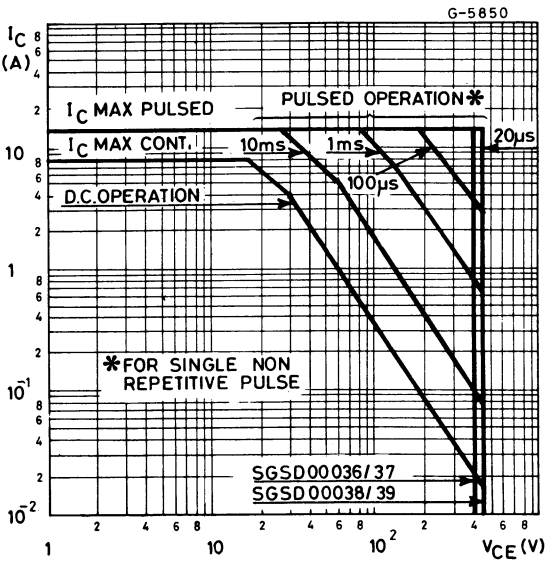
t_{on}	Turn-on time	I_C = 5A V_{CC} = 150V		0.3	0.8	μs
t_s	Storage time	I_{B1} = -I_{B2} = 1A		1.7	3.0	μs
t_f	Fall time			0.2	0.4	μs
t_{on}	Turn-on time	I_C = 5A V_{CC} = 150V		0.3	0.8	μs
t_s	Storage time	I_{B1} = -I_{B2} = 2A		1.0	2.0	μs
t_f	Fall time			0.1	0.25	μs

INDUCTIVE LOAD

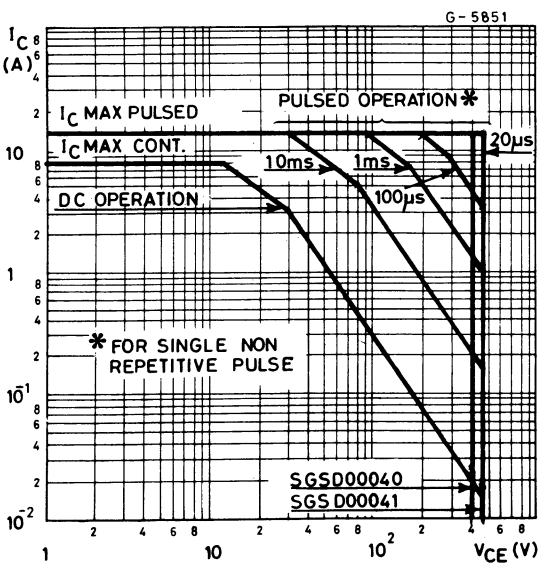
t_s	Storage time	I_C=5A; V_{CC}=150V; L=200μH		0.7	1.2	μs
t_f	Fall time	$V_{BE\,(off)}$=-5V; h_{FE}=5; T_{case}=25°C		0.50	0.12	μs
t_s	Storage time	I_C=5A; V_{CC}=150V; L=200μH		0.8	1.5	μs
t_f	Fall time	$V_{BE\,(off)}$=-5V; h_{FE}=5; T_{case}=100°C		0.09	0.24	μs

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

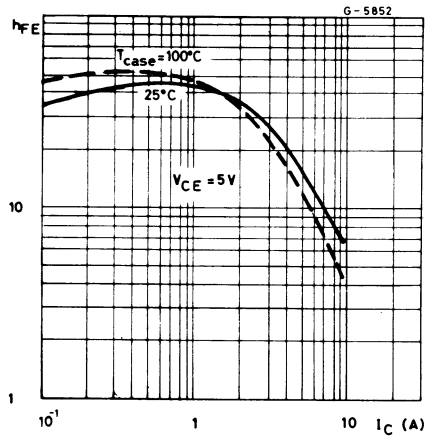
Safe operating areas for SGSD0036/37/38/39



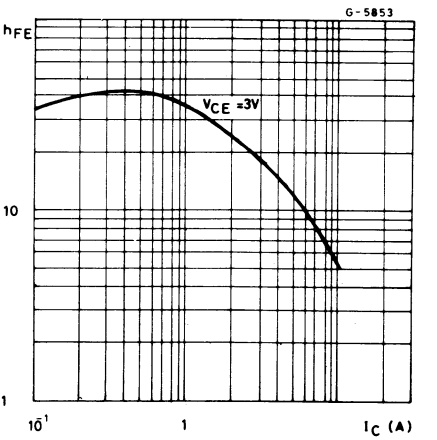
Safe operating areas for SGSD00040/41



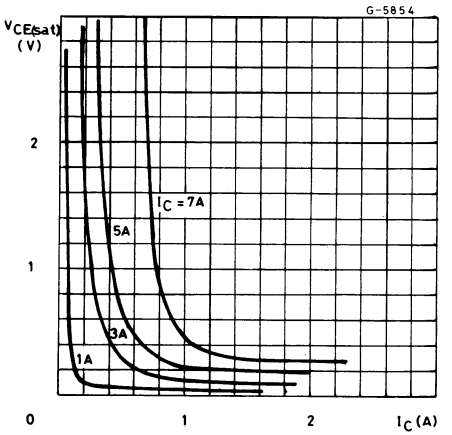
DC current gain



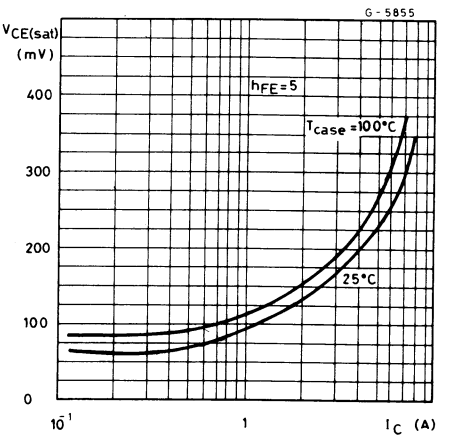
DC current gain



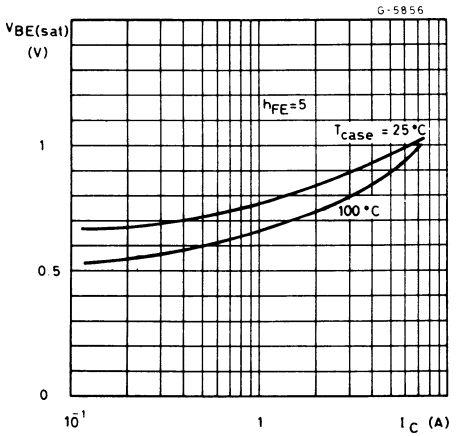
Collector-emitter saturation voltage



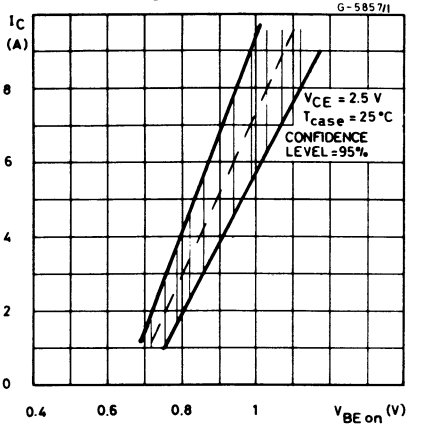
Collector-emitter saturation voltage



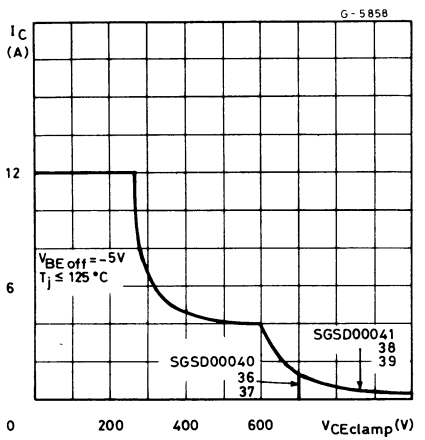
Base-emitter saturation voltage



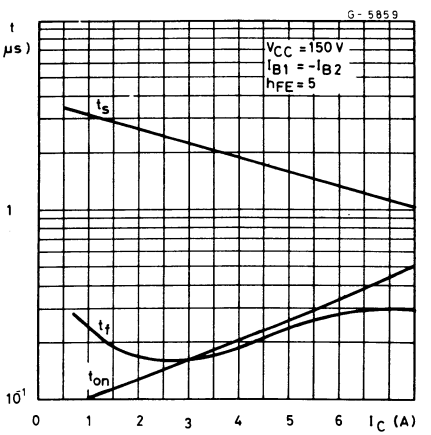
Collector current spread vs. base emitter voltage



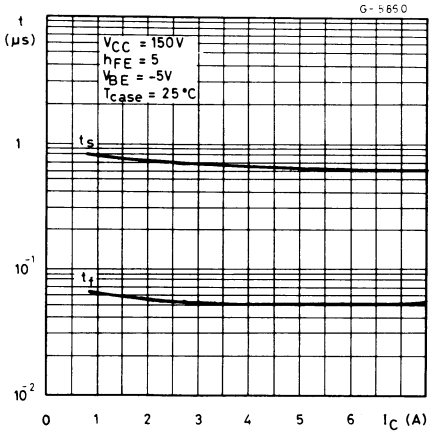
Reverse biased safe operating area



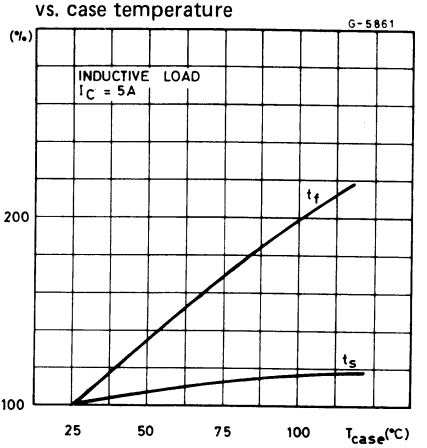
Resistive load switching times



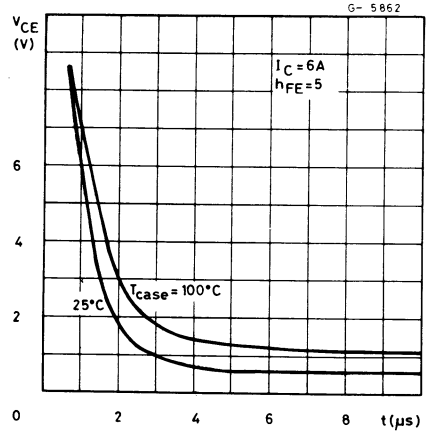
Inductive load switching times



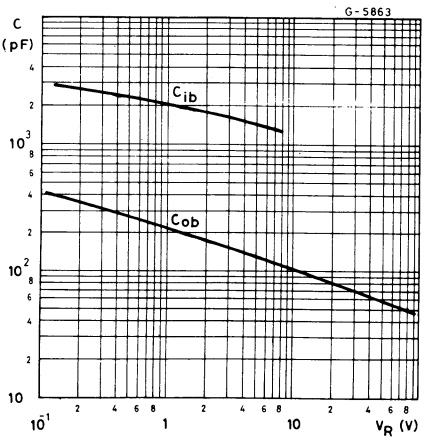
Switching times percentage variation vs. case temperature



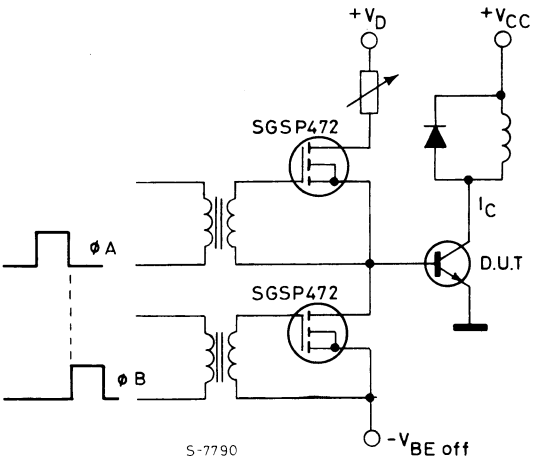
$V_{CE(sat)}$ Dynamic



Capacitance



SWITCHING TIMES TEST CIRCUIT



V_{CC} = 150V
L = 0.2mH

ϕ_A = pulse width must be adjusted to obtain desired I_C value
ϕ_B = pulse width equal to ϕ_A pulse duration

SGSD00042
SGSD00044

MULTIEPITAXIAL MESA HOLLOW EMITTER NPN

ADVANCE DATA

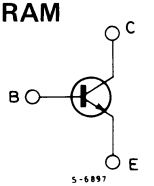
HIGH VOLTAGE FAST SWITCHING POWER TRANSISTORS

The SGSD00042 and SGSD00044 are multiepitaxial mesa hollow emitter NPN transistors in the TO-220 plastic package particularly intended for high voltage and fast switching applications at 20 to 100KHz.

ABSOLUTE MAXIMUM RATINGS

		SGSD00042	SGSD00044
V_{CES}	Collector-base voltage (V_{BE} = 0)	700V	1000V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400V	450V
V_{EBO}	Emitter-base voltage (I_C = 0)	7V	
I_C	Collector current	5A	
I_{CM}	Collector peak current ($t_p < 5ms$)	10A	
I_B	Base current	2A	
I_{BM}	Base peak current ($t_p < 5ms$)	4A	
P_{tot}	Total dissipation at $T_{case} < 25°C$	90W	
T_{stg}	Storage temperature	-65 to 150°C	
T_j	Max. operating junction temperature	150°C	

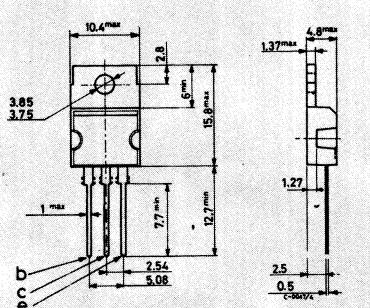
INTERNAL SCHEMATIC DIAGRAM



MECHANICAL DATA

Dimensions in mm

Collector connected to tab.



TO-220

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	1.38	°C/W

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

Parameter		Test Conditions		Min.	Typ.	Max.	Unit
I_{CES}	Collector cutoff current (V_{BE} = 0)	V_{CE} = rated V_{CES}				0.2	mA
I_{CEO}	Collector cutoff current (I_B = 0)	V_{CE} = 300V V_{CE} = 380V	for **SGSD00042** for **SGSD00044**			1 1	mA mA
I_{EBO}	Emitter cutoff current (I_C = 0)	V_{BE} = 7V				1	mA
$V_{CEO\ (sus)}$*	Collector emitter sustaining voltage	I_C = 0.1A	for **SGSD00042** for **SGSD00044**	400 450			V V
$V_{CE\ (sat)}$*	Collector-emitter saturation voltage	I_C = 4A I_C = 3.2A	I_B = 1A for **SGSD00042** I_B = 0.8A for **SGSD00044**			1 1	V V
$V_{BE\ (sat)}$*	Base-emitter saturation voltage	I_C = 3.2A	I_B = 0.8A			1.3	V

RESISTIVE LOAD

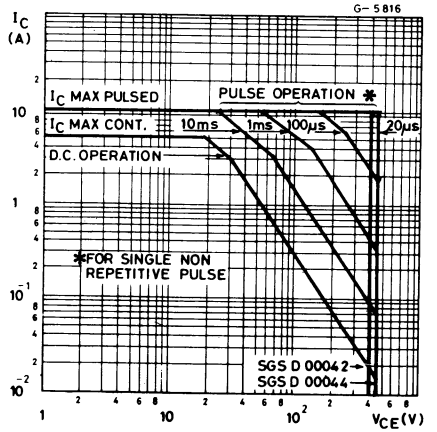
t_{on} t_s t_f	Turn-on time Storage time Fall time	I_C = 4A I_{B1} = -I_{B2} = 1A	V_{CC} = 150V		0.6 1.5 0.25	1.0 2.5 0.5	μs μs μs
t_{on} t_s t_f	Turn-on time Storage time Fall time	I_C = 4A $2I_{B1}$ = -I_{B2} = 2A	V_{CC} = 150V		0.5 0.7 0.08	1.0 1.5 0.25	μs μs μs

INDUCTIVE LOAD

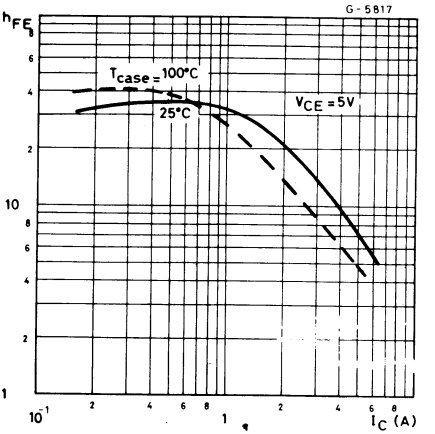
t_s t_f	Storage time Fall time	I_C=4A; V_{CC}=150V; L=200μH $V_{BE\ (off)}$=5V; h_{FE}=4; T_{case}=25°C		0.6 0.10	1.2 0.2	μs μs
t_s t_f	Storage time Fall time	I_C=4A; V_{CC}=150V; L=200μH $V_{BE\ (off)}$=-5V; h_{FE}=4; T_{case} = 100°C		0.7 0.15	1.5 0.3	μs μs

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

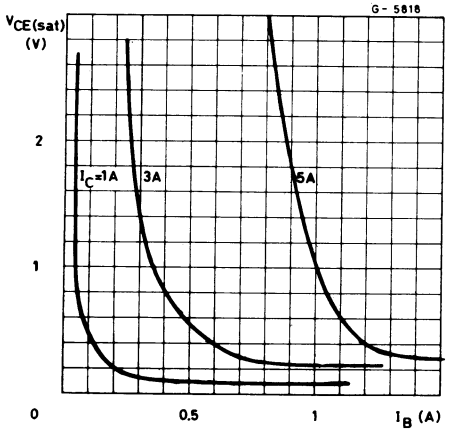
Safe operating areas



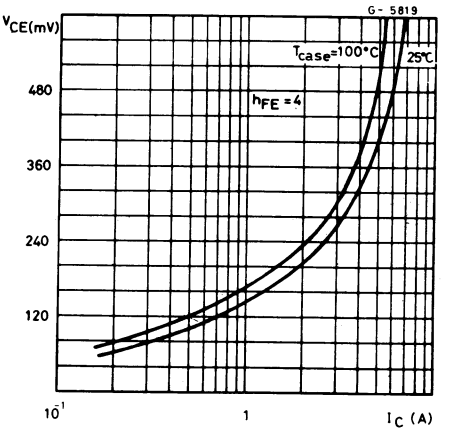
DC current gain



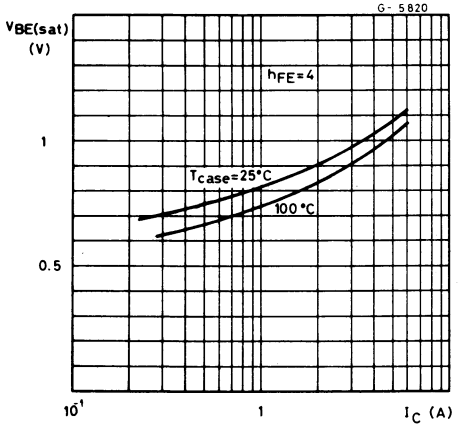
Collector-emitter saturation voltage



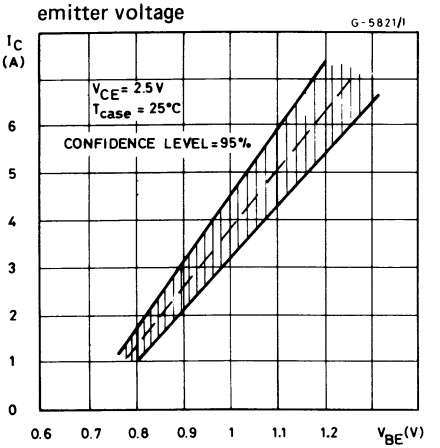
Collector-emitter saturation voltage



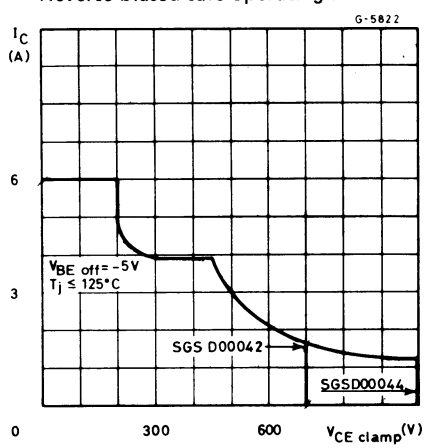
Base-emitter saturation voltage



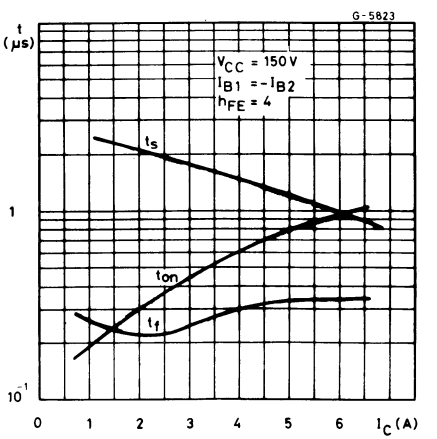
Collector current spread vs. base emitter voltage



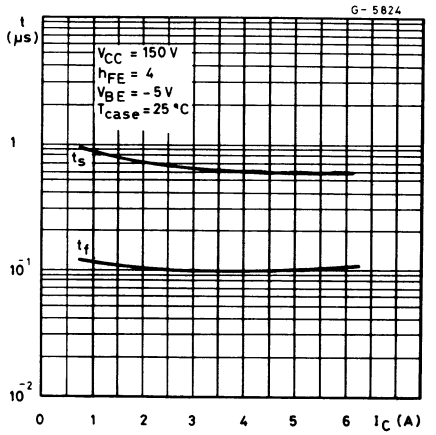
Reverse biased safe operating area



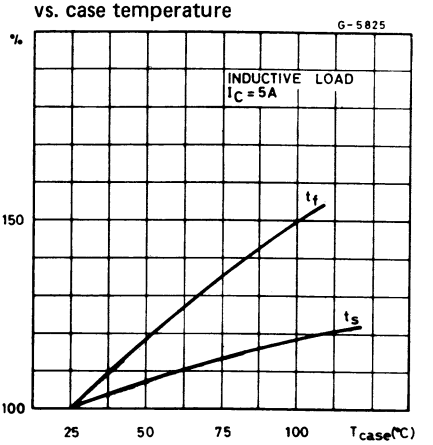
Resistive load switching times



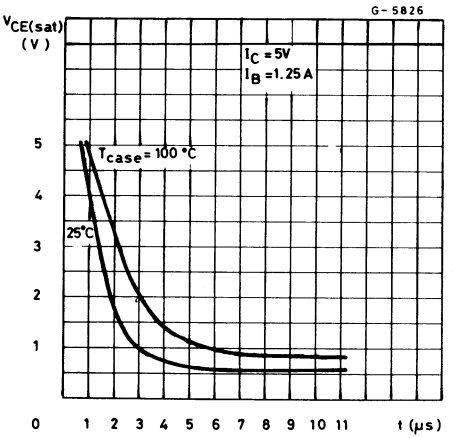
Inductive load switching times



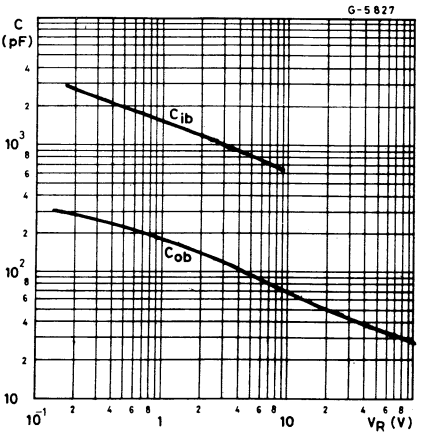
Switching times percentage variation vs. case temperature



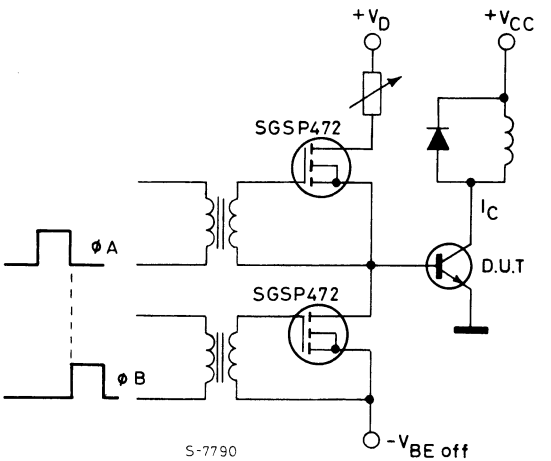
$V_{CE(sat)}$ Dynamic



Capacitance



SWITCHING TIMES TEST CIRCUIT



V_{CC} = 150V
L = 0.2mH

ϕ_A = pulse width must be adjusted to obtain desired I_C value
ϕ_B = pulse width equal to ϕ_A pulse duration.