

**Table 3: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$V_{CS(SS)}$	Collector-Source Voltage ( $V_{BS} = V_{GS} = 0\text{ V}$ )	1700	V
$V_{BS(OS)}$	Base-Source Voltage ( $I_C = 0, V_{GS} = 0\text{ V}$ )	30	V
$V_{SB(OS)}$	Source-Base Voltage ( $I_C = 0, V_{GS} = 0\text{ V}$ )	9	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_C$	Collector Current	3	A
$I_{CM}$	Collector Peak Current ( $t_p < 5\text{ ms}$ )	6	A
$I_B$	Base Current	2	A
$I_{BM}$	Base Peak Current ( $t_p < 1\text{ ms}$ )	4	A
$P_{tot}$	Total Dissipation at $T_C = 25\text{ }^\circ\text{C}$	100	W
$T_{stg}$	Storage Temperature	-65 to 125	$^\circ\text{C}$
$T_J$	Max. Operating Junction Temperature	125	$^\circ\text{C}$

**Table 4: Thermal Data**

Symbol	Parameter	Unit
$R_{thj-case}$	Thermal Resistance Junction-Case Max	$1\text{ }^\circ\text{C/W}$

**Table 5: Electrical Characteristics ( $T_{case} = 25\text{ }^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CS(SS)}$	Collector-Source Current ( $V_{BS} = V_{GS} = 0\text{ V}$ )	$V_{CS(SS)} = 1700\text{ V}$			100	$\mu\text{A}$
$I_{BS(OS)}$	Base-Source Current ( $I_C = 0, V_{GS} = 0\text{ V}$ )	$V_{BS(OS)} = 30\text{ V}$			10	$\mu\text{A}$
$I_{SB(OS)}$	Source-Base Current ( $I_C = 0, V_{GS} = 0\text{ V}$ )	$V_{SB(OS)} = 9\text{ V}$			100	$\mu\text{A}$
$I_{GS(OS)}$	Gate-Source Leakage	$V_{GS} = \pm 20\text{ V}$			500	nA
$V_{CS(ON)}$	Collector-Source ON Voltage	$V_{GS} = 10\text{ V } I_C = 1.8\text{ A } I_B = 0.36\text{ A}$ $V_{GS} = 10\text{ V } I_C = 0.7\text{ A } I_B = 70\text{ mA}$		1 1	1.5 1.3	V V
$h_{FE}$	DC Current Gain	$I_C = 1.8\text{ A } V_{CS} = 1\text{ V } V_{GS} = 10\text{ V}$ $I_C = 0.7\text{ A } V_{CS} = 1\text{ V } V_{GS} = 10\text{ V}$	3.5 6	5 10		
$V_{BS(ON)}$	Base-Source ON Voltage	$V_{GS} = 10\text{ V } I_C = 1.8\text{ A } I_B = 0.36\text{ A}$ $V_{GS} = 10\text{ V } I_C = 0.7\text{ A } I_B = 70\text{ mA}$		1 0.8	1.2 1	V V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{BS} = V_{GS} \quad I_B = 250\text{ }\mu\text{A}$	1.5	2.2	3	V
$C_{iss}$	Input Capacitance	$V_{CS} = 25\text{ V} \quad f = 1\text{ MHz}$ $V_{GS} = V_{CB} = 0$		750		pF
$Q_{GS(tot)}$	Gate-Source Charge	$V_{CS} = 15\text{ V} \quad V_{GS} = 10\text{ V}$ $V_{CB} = 0 \quad I_C = 1.8\text{ A}$		12.5		nC
$t_s$	INDUCTIVE LOAD Storage Time	$V_{GS} = 10\text{ V}$ $R_G = 47\text{ }\Omega \quad V_{Clamp} = 1200\text{ V}$		760		ns
$t_f$	Fall Time	$t_p = 4\text{ }\mu\text{s} \quad I_C = 1.8\text{ A } I_B = 0.36\text{ A}$		14		ns

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_s$ $t_f$	INDUCTIVE LOAD Storage Time Fall Time	$V_{GS} = 10\text{ V}$ $R_G = 47\ \Omega$ $t_p = 4\ \mu\text{s}$ $V_{Clamp} = 1200\text{ V}$ $I_C = 0.7\text{ A}$ $I_B = 70\text{ mA}$		690 32		ns ns
$V_{CSW}$	Maximum Collector-Source Voltage without Snubber	$R_G = 47\ \Omega$ $h_{FE} = 5\text{ A}$ $I_C = 3\text{ A}$	1500			V
$V_{CS(dyn)}$	Collector-Source Dynamic Voltage (500 ns)	$V_{CC} = V_{Clamp} = 400\text{ V}$ $R_G = 47\ \Omega$ $I_B = 0.1\text{ A}$ $t_{peak} = 500\text{ ns}$ $V_{GS} = 10\text{ V}$ $I_C = 0.5\text{ A}$ $I_{Bpeak} = 1\text{ A}$		3.9		V
$V_{CS(dyn)}$	Collector-Source Dynamic Voltage (1 $\mu\text{s}$ )	$V_{CC} = V_{Clamp} = 400\text{ V}$ $R_G = 47\ \Omega$ $I_B = 0.1\text{ A}$ $t_{peak} = 500\text{ ns}$ $V_{GS} = 10\text{ V}$ $I_C = 0.5\text{ A}$ $I_{Bpeak} = 1\text{ A}$		2.2		V

Figure 3: Safe Operating Area

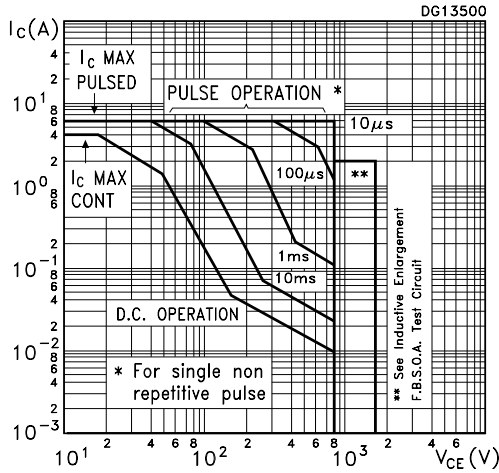


Figure 4: Reverse Biased Safe Operating Area

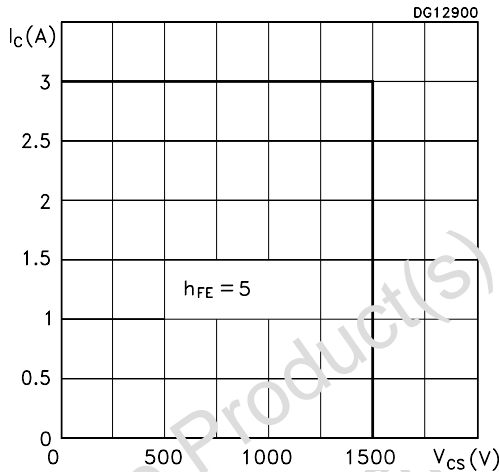


Figure 5: DC Current Gain

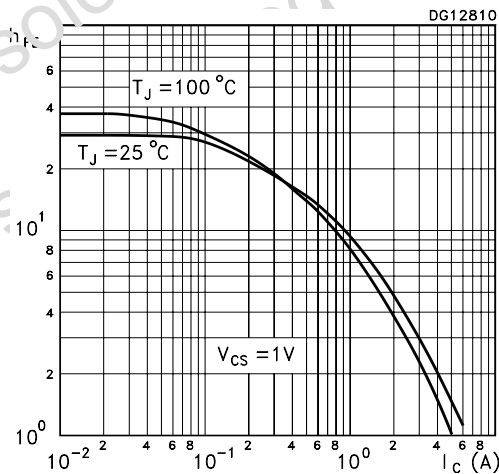


Figure 6: Output Characteristics

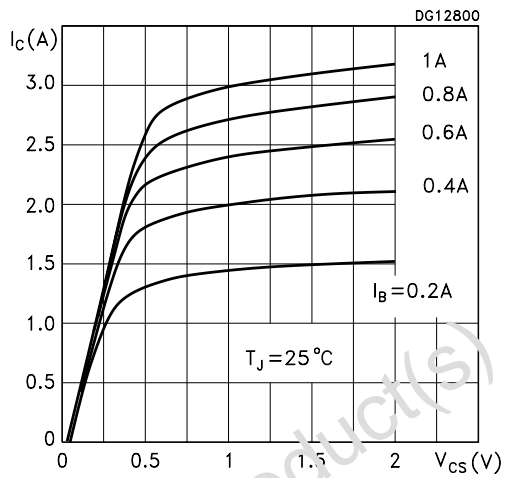


Figure 7: Gate Threshold Voltage vs Temperature

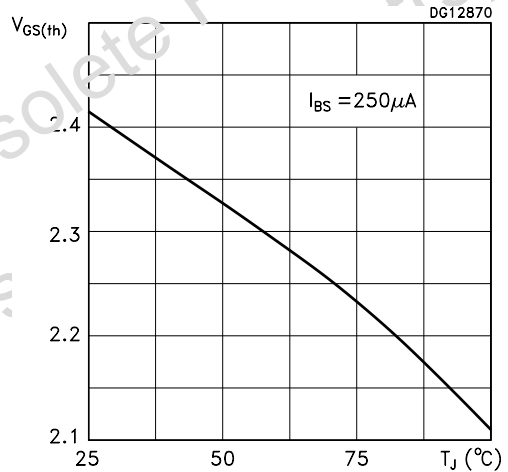


Figure 8: DC Current Gain

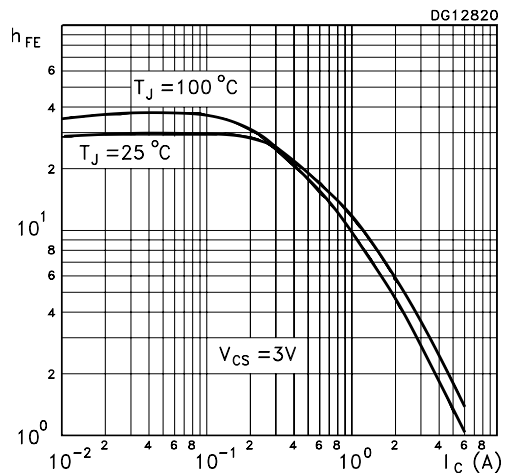


Figure 9: Collector-Source On Voltage

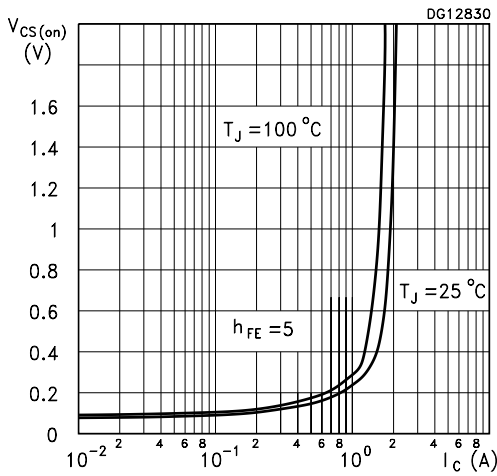


Figure 10: Base-Source On Voltage

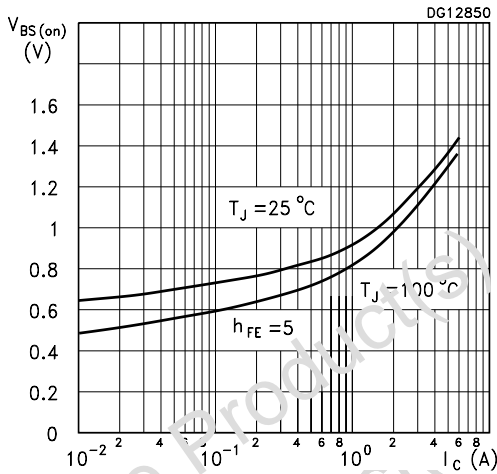


Figure 11: Inductive Load Switching Time

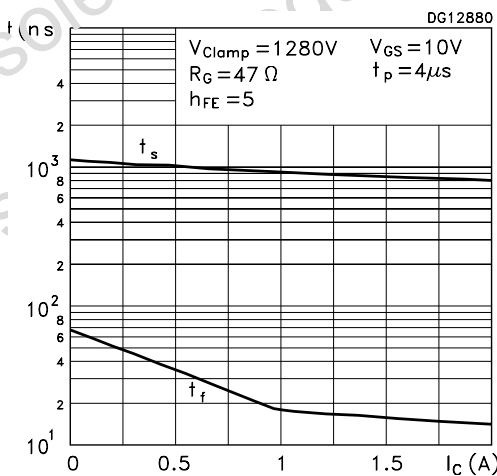


Figure 12: Collector-Source On Voltage

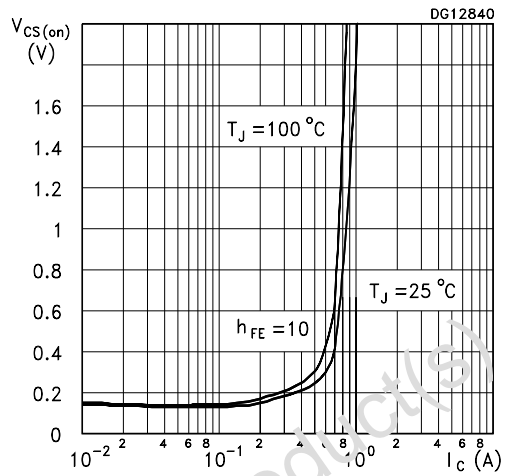


Figure 13: Base-Source On Voltage

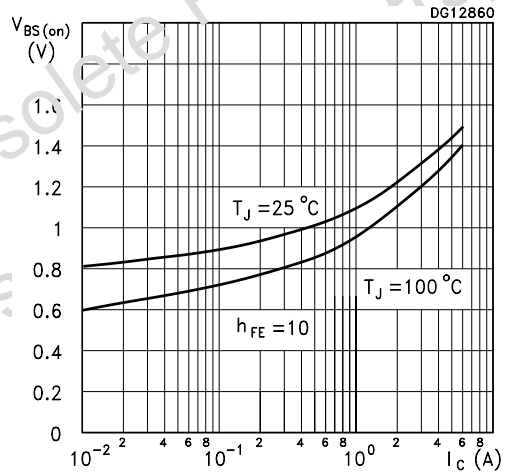


Figure 14: Inductive Load Switching Time

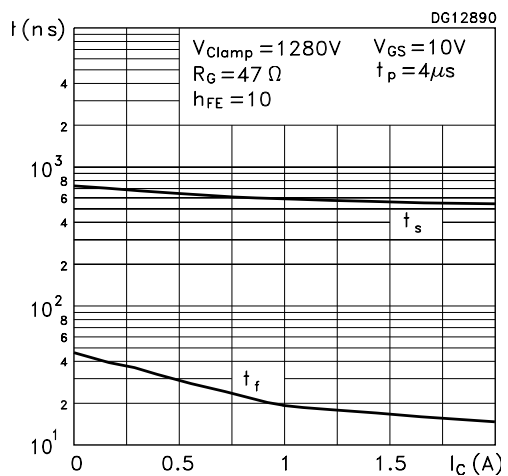


Figure 15: Dynamic Collector-Emitter Saturation Voltage

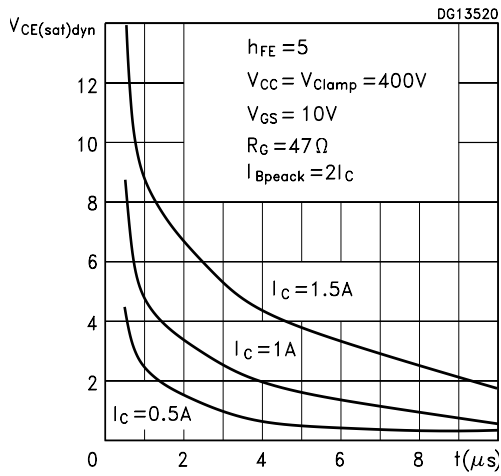


Figure 16: Inductive Load Enlargement FBSOA Circuit

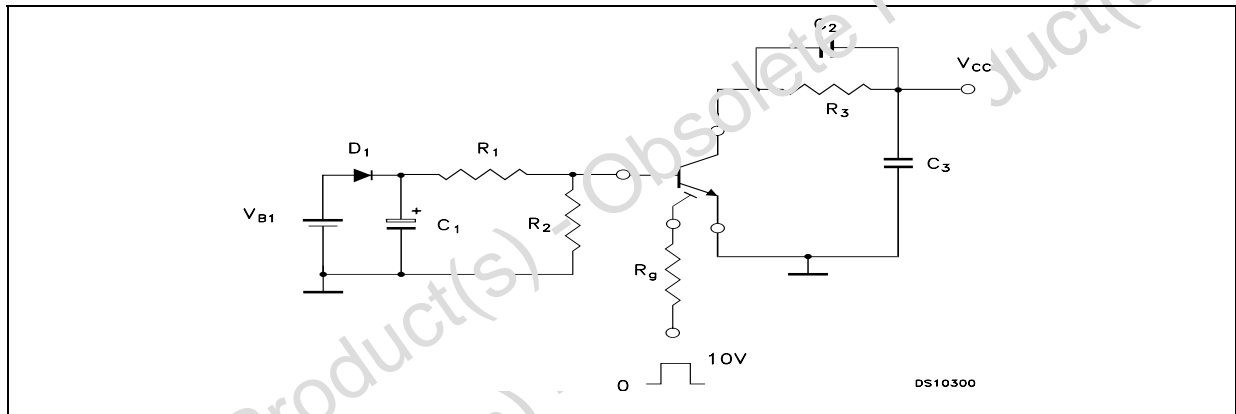
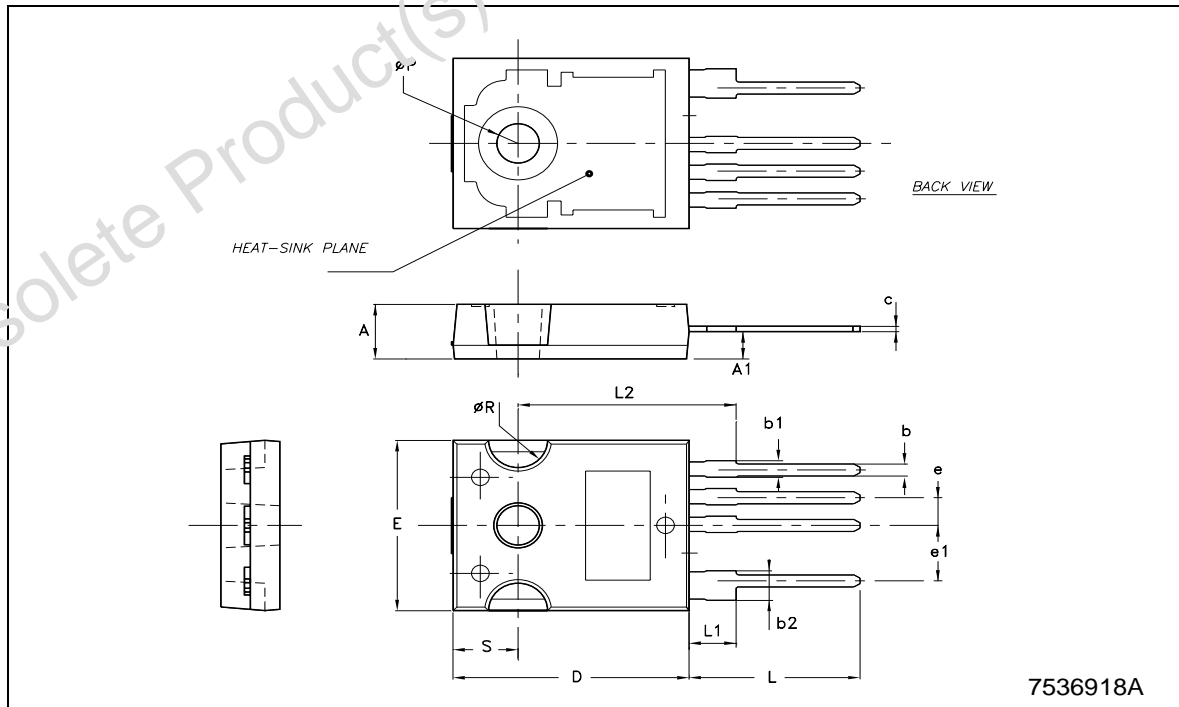


Table 6: Components, Values

$V_{B1} = 4.13V$	$C_1 = 220nF$
$D_1 = 5A157$	$C_2 \leq 70pF$
$R_1 = 1\Omega$	$C_3 = 50nF$
$R_2 = 100\Omega$	$V_g = 10V$
$R_3 = V_{CC} / I_{Cn}$	Pulse Time = $5\mu s$
$R_g = 47\Omega$	

## TO247-4L MECHANICAL DATA

DIM.	mm		
	MIN.	TYP.	MAX.
A	4.85		5.15
A1	2.20		2.60
b	0.95	1.10	1.30
b1	1.30		1.70
b2	2.50		2.90
c	0.40		0.90
D	19.85		20.15
E	15.45		15.75
e		2.54	
e1		5.08	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
ØP	3.55		3.65
ØR	4.50		5.50
S		5.50	



**Table 7: Revision History**

Date	Release	Change Designator
13-Sep-2004	1	First Release.
04-Oct-2004	2	Figure 15 has been updated on page 6.

Obsolete Product(s) - Obsolete Product(s)  
Obsolete Product(s) - Obsolete Product(s)

Obsolete Product(s) - Obsolete Product(s)

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