

TOSHIBA IGBT Module Silicon N Channel IGBT

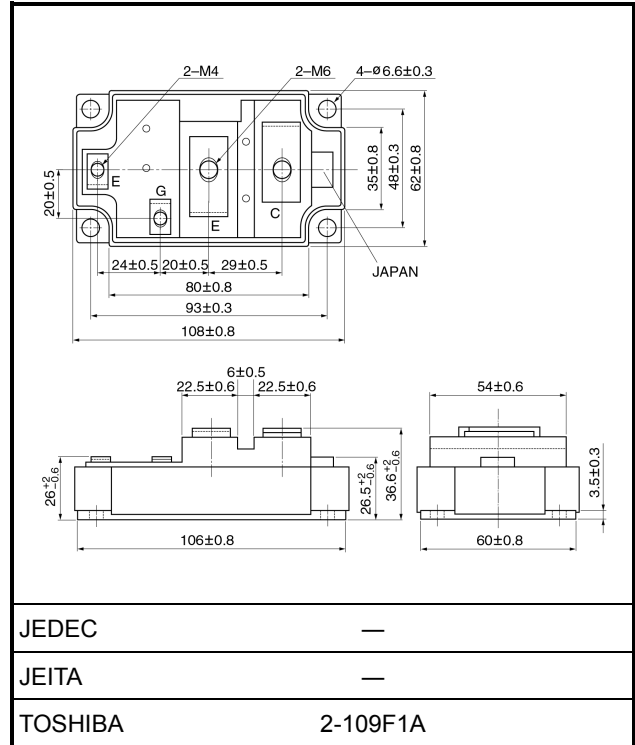
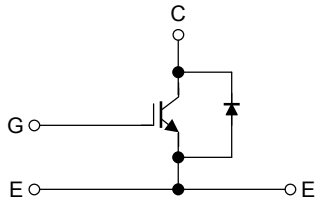
MG600Q1US61

High Power Switching Applications
 Motor Control Applications

Unit: mm

- High input impedance
- High speed: $t_f = 0.3 \mu s$ (max)
 Inductive load
- Low saturation voltage: $V_{CE(sat)} = 2.6 V$ (max)
- The electrodes are isolated from case.
- Enhancement-mode

Equivalent Circuit



Weight: 465 g (typ.)

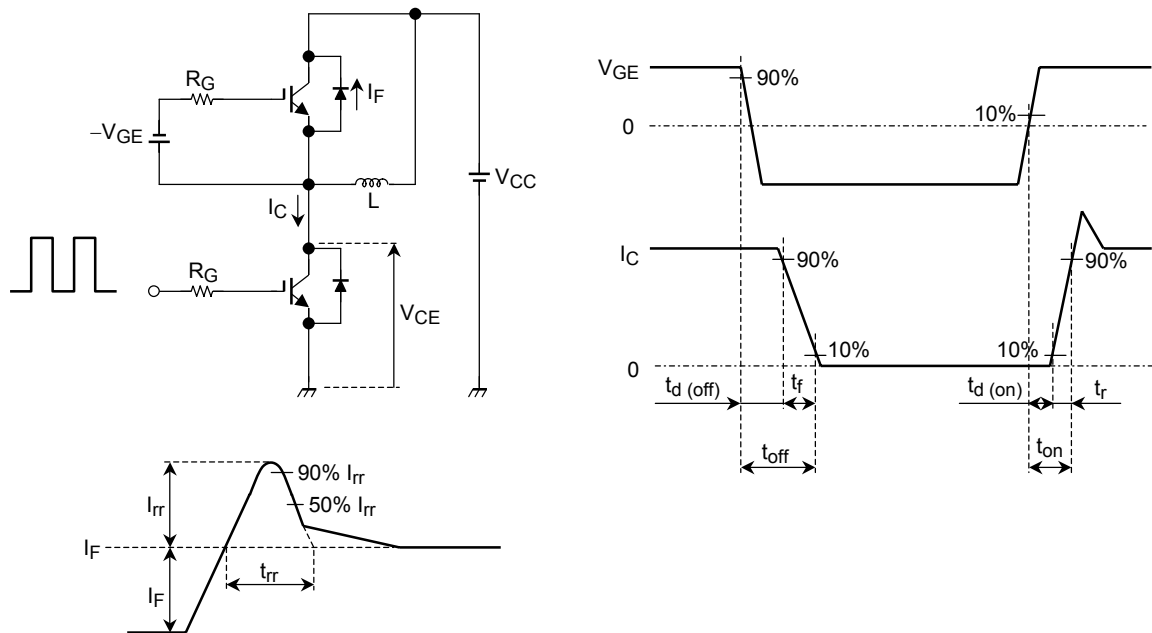
Maximum Ratings ($T_c = 25^\circ C$)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	1200	V
Gate-emitter voltage		V_{GES}	± 20	V
Collector current	DC ($T_c = 80^\circ C$)	I_C	600	A
Forward current	DC ($T_c = 80^\circ C$)	I_F	600	A
Collector power dissipation ($T_c = 25^\circ C$)		P_C	5400	W
Junction temperature		T_j	150	$^\circ C$
Storage temperature range		T_{stg}	-40 to 125	$^\circ C$
Isolation voltage		V_{isol}	2500 (AC 1 minute)	V _{rms}
Screw torque	Terminal	—	3	N·m
	Mounting	—	3	N·m

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current		I_{GES}	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0 \text{ V}$	—	—	± 500	nA	
Collector cut-off current		I_{CES}	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}$	—	—	1	mA	
Gate-emitter cut-off voltage		$V_{GE (off)}$	$I_C = 600 \text{ mA}, V_{CE} = 5 \text{ V}$	6.0	7.0	8.0	V	
Collector-emitter saturation voltage		$V_{CE (sat)}$	$I_C = 600 \text{ A}, V_{GE} = 15 \text{ V}$	$T_c = 25^\circ\text{C}$	—	2.1	2.6	V
				$T_c = 125^\circ\text{C}$	—	2.7	3.2	
Input capacitance		C_{ies}	$V_{CE} = 10 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}$	—	50000	—	pF	
Switching time	Turn-on delay time	$t_{d (on)}$	Inductive load $V_{CC} = 600 \text{ V}$ $I_C = 600 \text{ A}$ $V_{GE} = \pm 15 \text{ V}$ $R_G = 2.0 \Omega$ (Note 1)	—	0.3	—	μs	
	Rise time	t_r		—	0.2	—		
	Turn-on time	t_{on}		—	0.5	—		
	Turn-off delay time	$t_{d (off)}$		—	0.5	—		
	Fall time	t_f		—	0.1	0.3		
	Turn-off time	t_{off}		—	0.6	—		
Forward voltage		V_F	$I_F = 600 \text{ A}, V_{GE} = 0 \text{ V}$	$T_c = 25^\circ\text{C}$	—	2.4	2.8	V
				$T_c = 125^\circ\text{C}$	—	2.2	—	
Reverse recovery time		t_{rr}	$I_F = 600 \text{ A}, V_{GE} = -15 \text{ V}, di/dt = 1500 \text{ A}/\mu\text{s}$	—	0.2	—	μs	
Thermal resistance		$R_{th (j-c)}$	Transistor stage	—	—	0.023	$^\circ\text{C}/\text{W}$	
			Diode stage	—	—	0.05		

Note 1: Switching time and reverse recovery time test circuit and timing chart



< $V_{CE(sat)}$ Rank >

$V_{CE(sat)}$

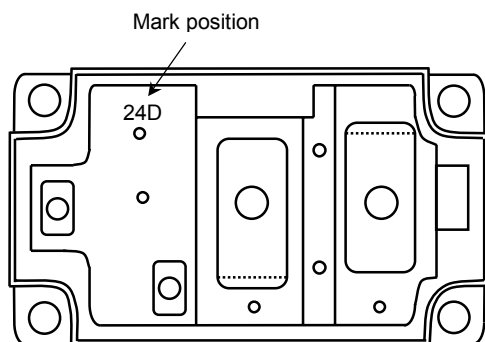
Rank Symbol	Min	Max
21	1.80	2.10
22	1.90	2.20
23	2.00	2.30
24	2.10	2.40
25	2.20	2.50
26	2.30	2.60
27	2.40	2.70

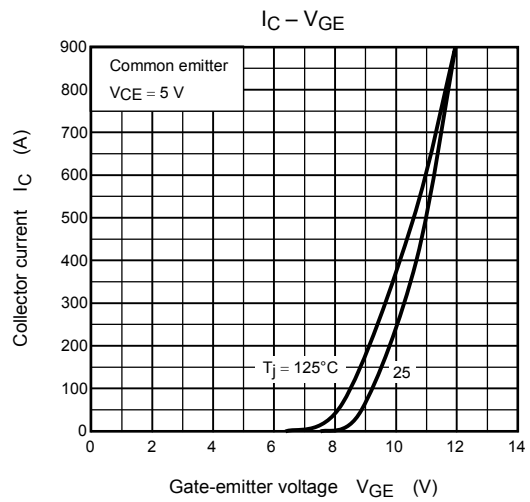
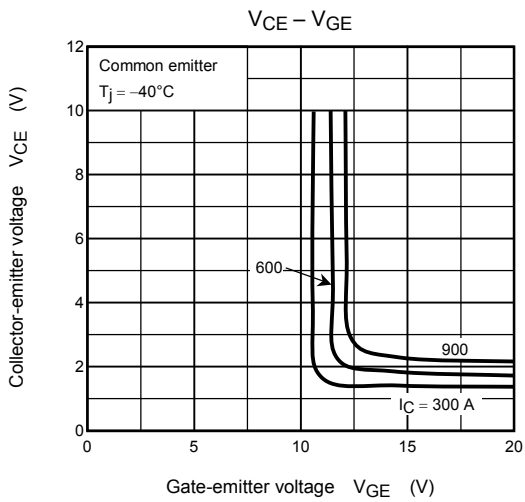
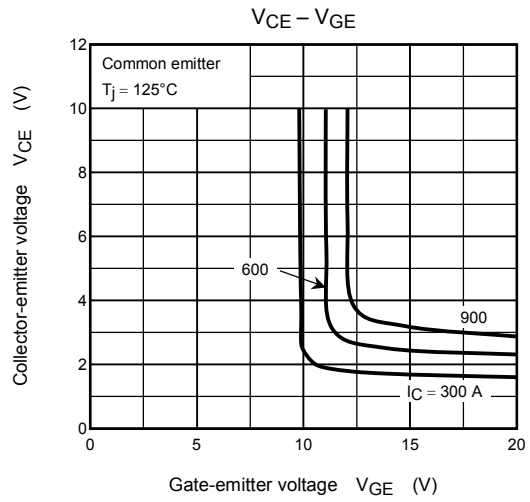
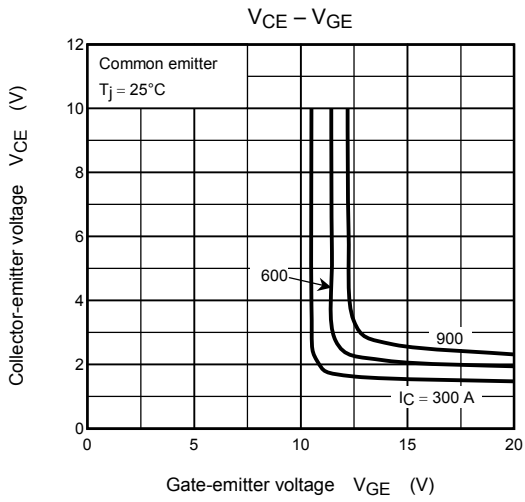
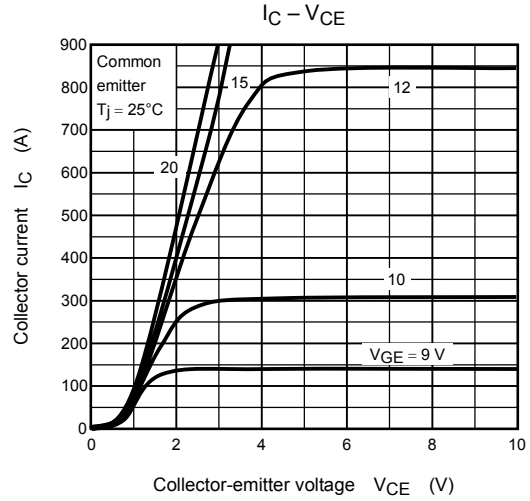
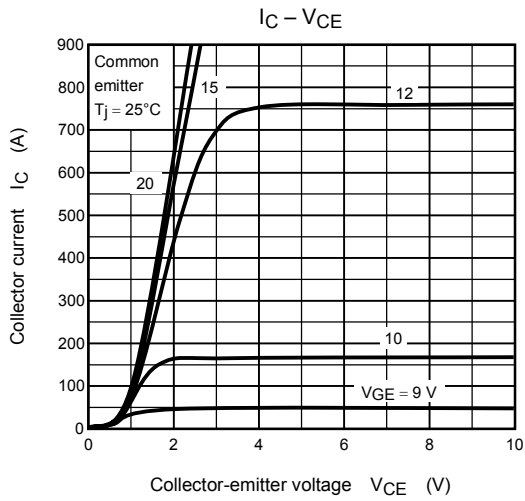
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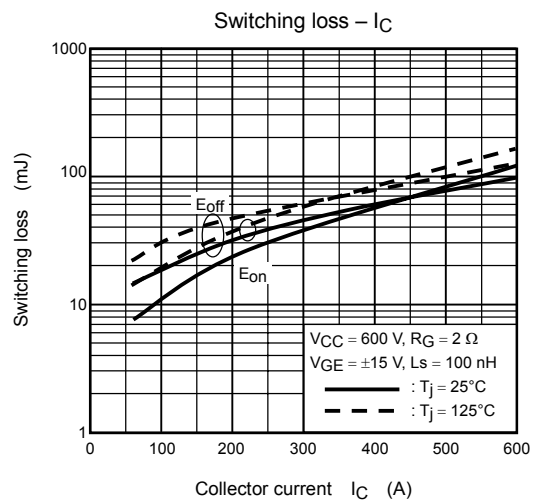
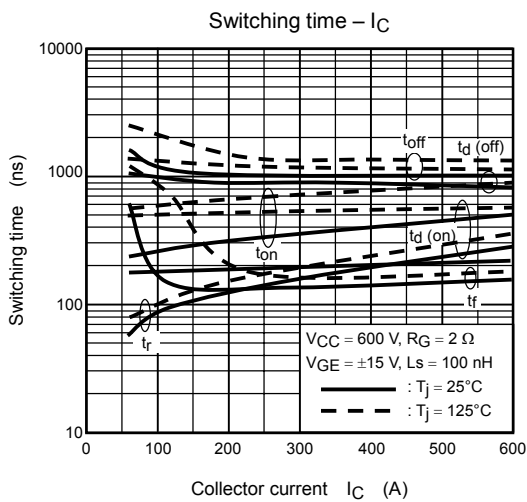
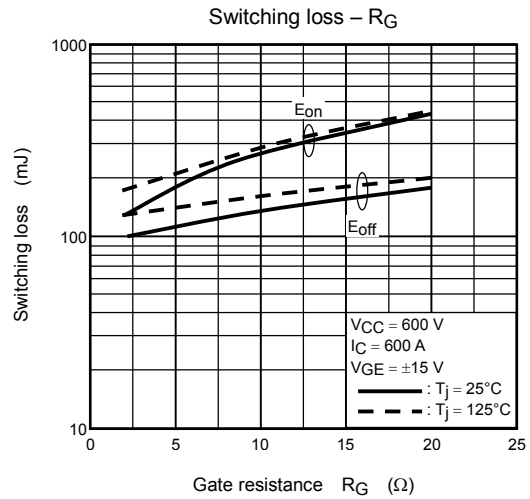
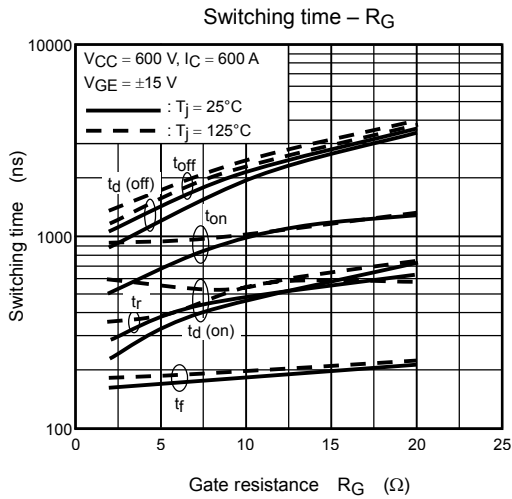
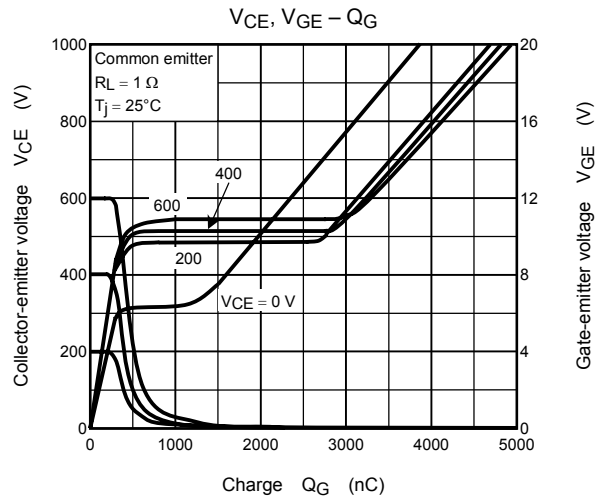
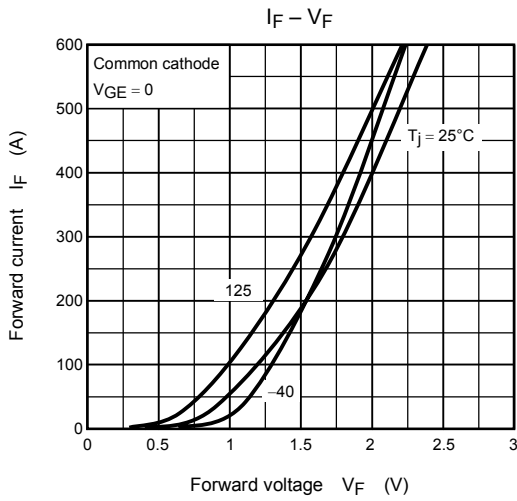
V_F

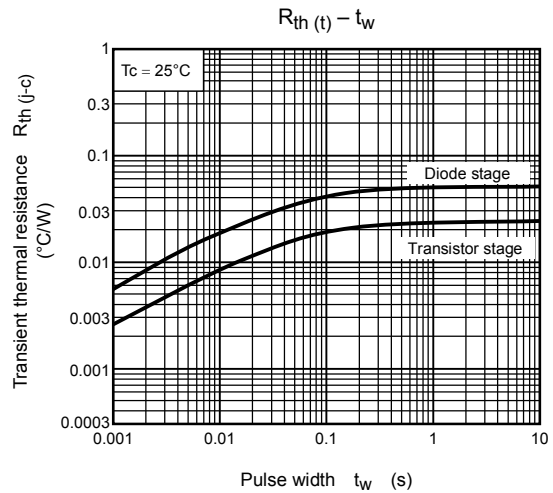
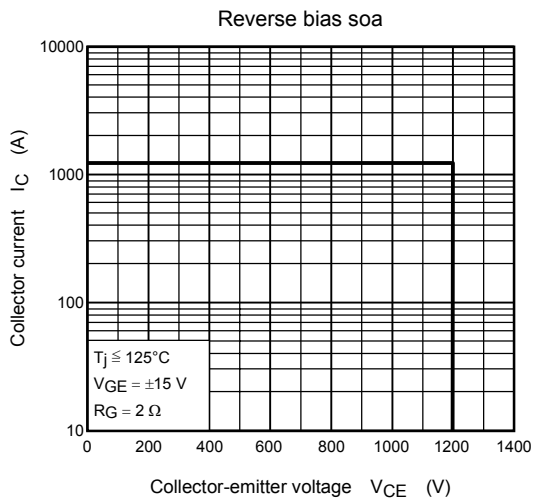
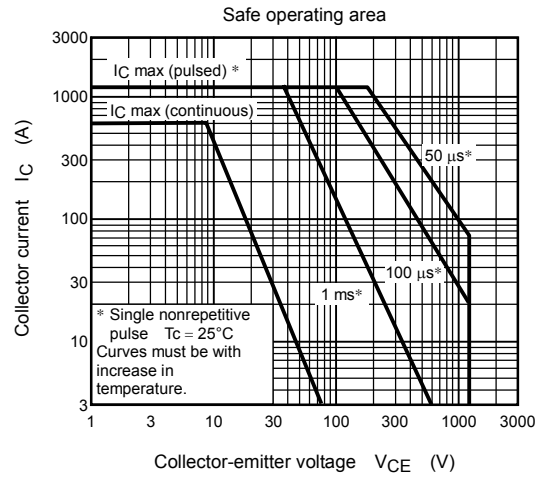
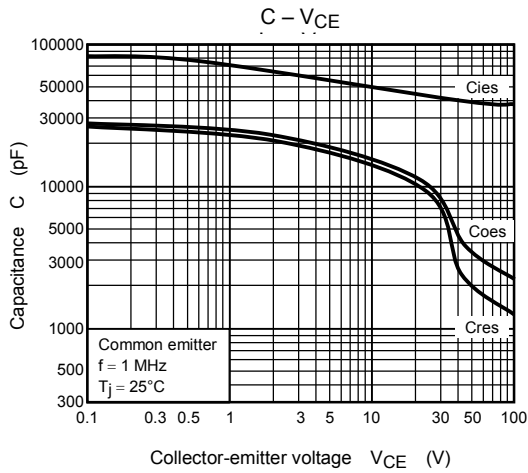
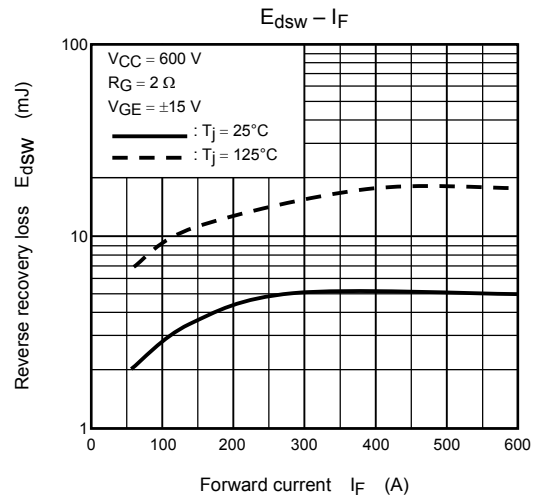
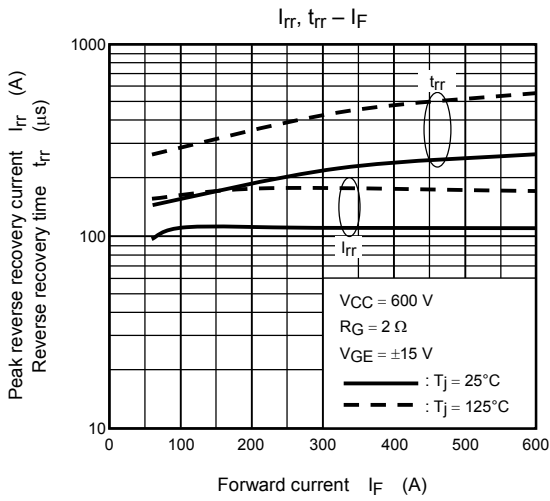
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E	2.10	2.40
F	2.30	2.60
G	2.50	2.80

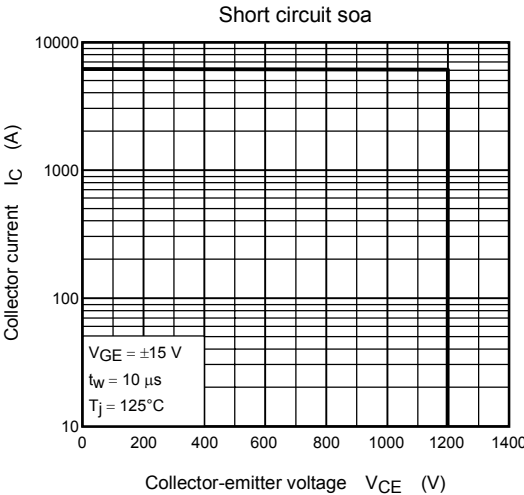
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