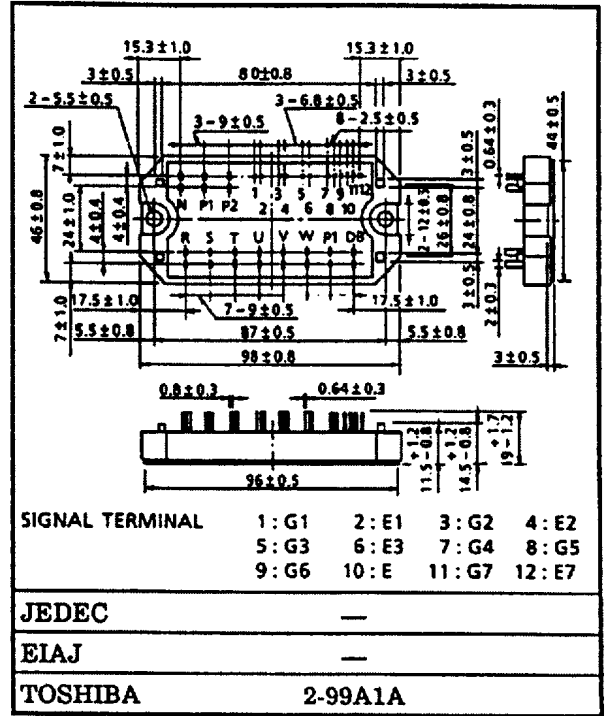


High Power Switching Applications

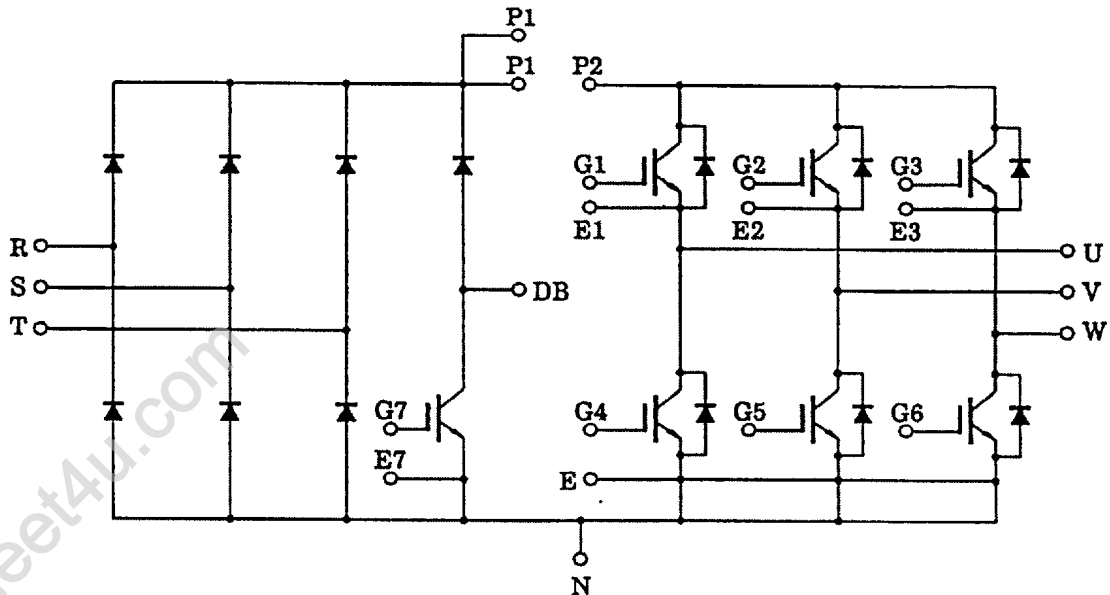
Motor Control Applications

- Integrates Inverter, Converter and Brake Power Circuits in One Package.
- Output (Inverter Stage)
 - : 3 ϕ 15A/1200V High Speed Type IGBT
 - $V_{CE(sat)} = 4.00V$ (Max.)
 - $t_f = 0.30\mu s$ (Max.)
 - $t_{rr} = 0.15\mu s$ (Max.)
- Input (Converter Stage)
 - : 3 ϕ 15A/1600V Silicon Rectifier
 - $V_F = 1.20V$ (Max.)
- Brake Stage
 - : 8A/1200V IGBT & 8A/1200V FRD
- The Electrodes are Isolated from Case.



Weight : 175g

Equivalent Circuit



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Maximum Ratings (Ta = 25°C)

STAGE	CHARACTERISTIC		SYMBOL	RATINGS	UNIT	
Inverter	Collector-Emitter Voltage		V _{CEs}	1200	V	
	Gate-Emitter Voltage		V _{GES}	±20	V	
	Collector Current	DC	I _C	15	A	
		1ms	I _{CP}	30		
	Forward Current	DC	I _F	15	A	
		1ms	I _{FM}	30		
Collector Power Dissipation (Tc = 25°C)		P _C	125	W		
Converter	Repetitive Peak Reverse Voltage		V _{RRM}	1600	V	
	Average Output Rectified Current		I _O	15	A	
	Peak One Cycle Surge Forward Current (50Hz, Non-Repetitive)		I _{FSM}	250	A	
Brake	IGBT	Collector-Emitter Voltage		V _{CEs}	1200	V
		Gate-Emitter Voltage		V _{GES}	±20	V
		Collector Current	DC	I _C	8	A
			1ms	I _{CP}	16	
	Collector Power Dissipation (Tc = 25°C)		P _C	80	W	
	FRD	Repetitive Peak Reverse Voltage		V _{RRM}	1200	V
		Forward Current	DC	I _F	8	A
			1ms	I _{FM}	16	
Junction Temperature		T _j	150	°C		
Storage Temperature Range		T _{stg}	-40 ~ 125	°C		
Isolation Voltage		V _{isol}	2500 (AC 1 minute)	V		
Screw Torque		—	3	N•m		

Electrical Characteristics (Ta = 25°C)

a. Inverter Stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MX.	UNIT
Gate Leakage Current		I _{GES}	V _{GE} = ±20V, V _{CE} = 0	—	—	±10	µA
Collector Cut-off Current		I _{CES}	V _{CE} = 1200V, V _{GE} = 0	—	—	1.0	mA
Gate-Emitter Cut-off Voltage		V _{GE (off)}	I _C = 15mA, V _{CE} = 5V	3.0	—	6.0	V
Collector-Emitter Saturation Voltage		V _{CE (sat)}	I _C = 15A, V _{GE} = 15V	—	3.00	4.00	V
Input Capacitance		C _{ies}	V _{CE} = 10V, V _{GE} = 0 f = 1MHz	—	1850	—	pF
Switching Time	Turn-on Delay Time	t _{d(on)}	Inductive Load V _{CC} = 600V I _C = 15A V _{GE} = ±15V R _G = 100Ω (Note 1)	—	0.08	0.16	µs
	Rise Time	t _r		—	0.12	0.24	
	Turn-on Time	t _{on}		—	0.40	0.80	
	Turn-off Delay Time	t _{d (off)}		—	0.30	0.60	
	Fall Time	t _f		—	0.20	0.40	
	Turn-off Time	t _{off}		—	0.70	1.30	
Forward Voltage		V _F	I _F = 15A, V _{GE} = 0	—	2.00	2.50	V
Reverse Recovery Time		t _{rr}	I _F = 15A, V _{GE} = -10V di/dt = 100A/µs	—	0.20	0.50	µs
Thermal Resistance		R _{th (j-c)}	Transistor	—	—	1.00	°C/W
			Diode	—	—	1.80	

b. Converter Stage

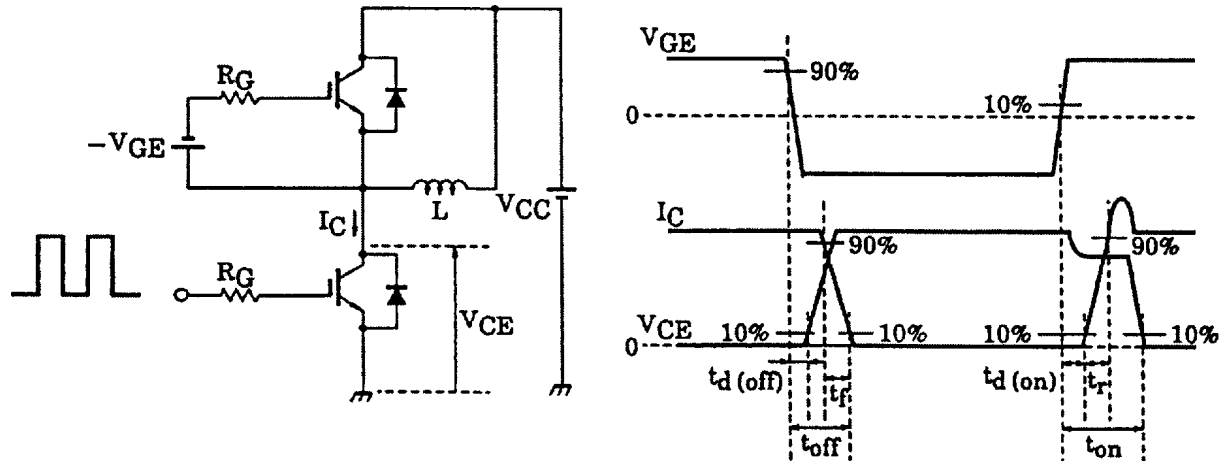
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MX.	UNIT
Repetitive Peak Reverse Current	I_{RRM}	$V_{RRM} = 1600V$	–	–	50	μA
Peak Forward Voltage	V_{FM}	$I_{FM} = 15A$	–	1.05	1.20	V
Peak One Cycle Surge Forward Current	I_{FSM}	50Hz Sine-half-wave	250	–	–	A
Thermal Resistance	$R_{th(j-c)}$	–	–	–	2.50	$^{\circ}C/W$

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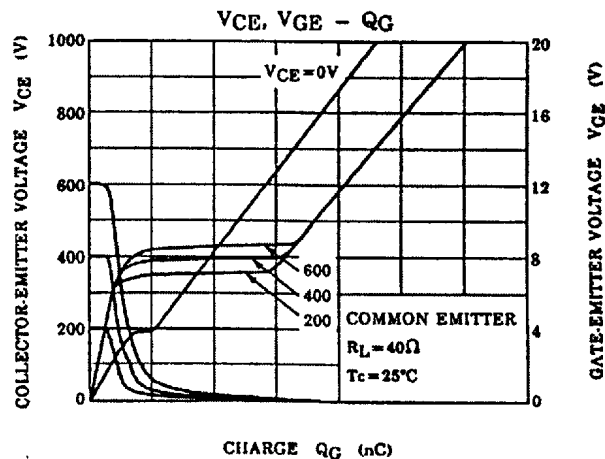
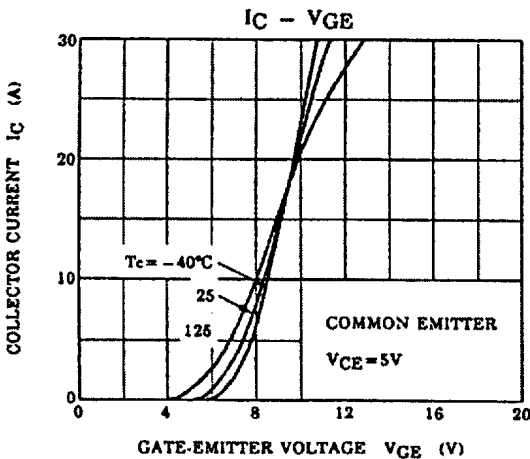
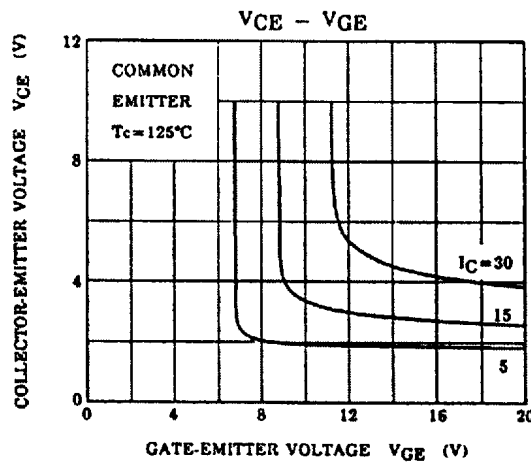
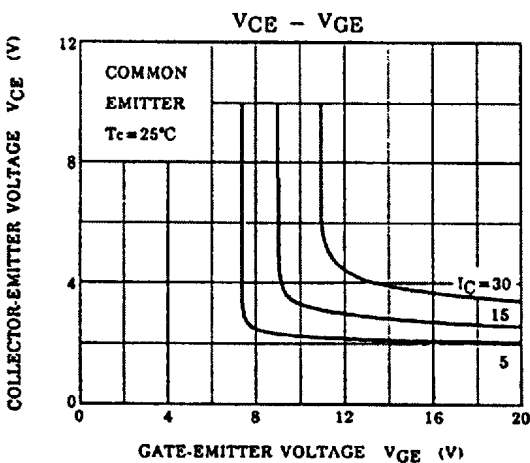
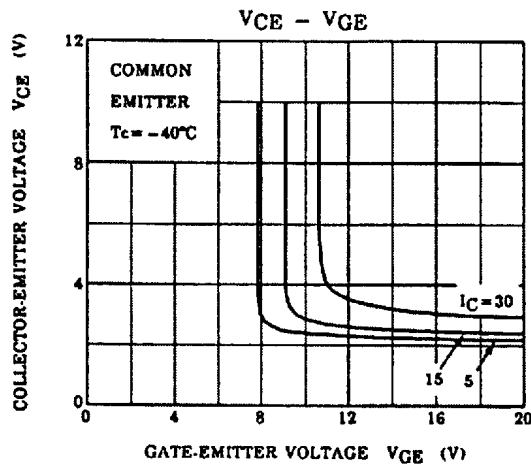
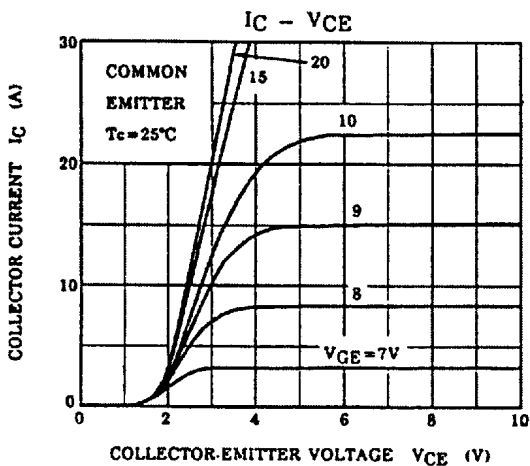
c. Brake Stage

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MX.	UNIT
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 20V, V_{CE} = 0$	-	-	± 10	μA
Collector Cut-off Current		I_{CES}	$V_{CE} = 1200V, V_{GE} = 0$	-	-	1.0	mA
Repetitive Peak Reverse Current		I_{RRM}	$V_{RRM} = 1200V$	-	-	1.0	mA
Gate-Emitter Cut-off Voltage		$V_{GE(off)}$	$I_C = 8mA, V_{CE} = 5V$	3.0	-	6.0	V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 8A, V_{GE} = 15V$	-	3.00	4.00	V
Input Capacitance		C_{ies}	$V_{CE} = 10V, V_{GE} = 0$ $f = 1MHz$	-	1000	-	pF
Switching Time	Turn-on Delay Time	$t_{d(on)}$	Inductive Load $V_{CC} = 600V$ $I_C = 8A$ $V_{GE} = \pm 15V$ $R_G = 150\Omega$ (Note 1)	-	0.08	0.16	μs
	Rise Time	t_r		-	0.12	0.24	
	Turn-on Time	t_{on}		-	0.40	0.80	
	Turn-off Delay Time	$t_{d(off)}$		-	0.30	0.60	
	Fall Time	t_f		-	0.30	0.50	
	Turn-off Time	t_{off}		-	0.70	1.30	
Forward Voltage		V_F	$I_F = 8A, V_{GE} = 0$	-	1.20	2.50	V
Thermal Resistance		$R_{th(j-c)}$	Transistor	-	-	1.56	$^{\circ}C/W$
			Diode	-	-	1.80	

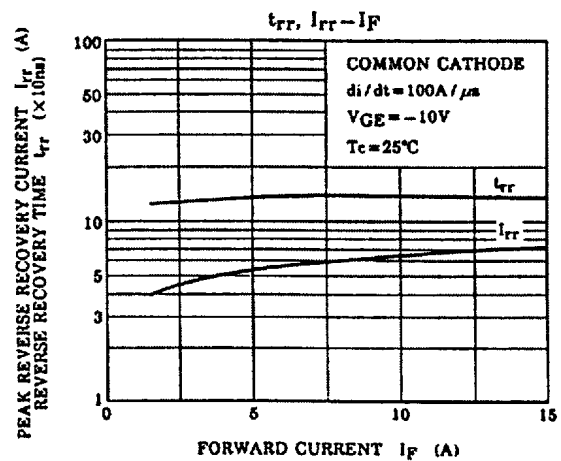
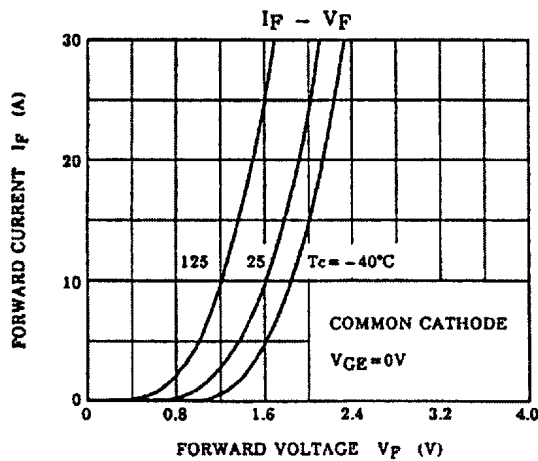
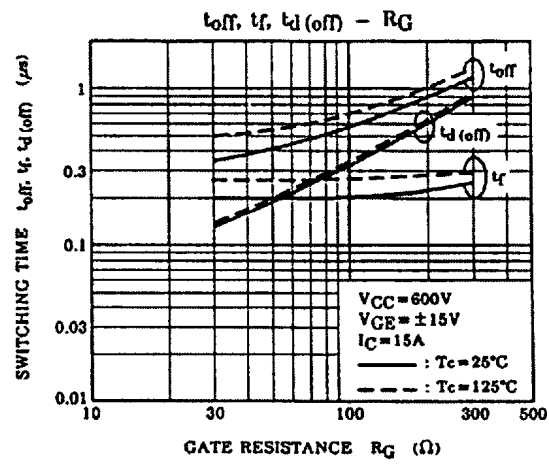
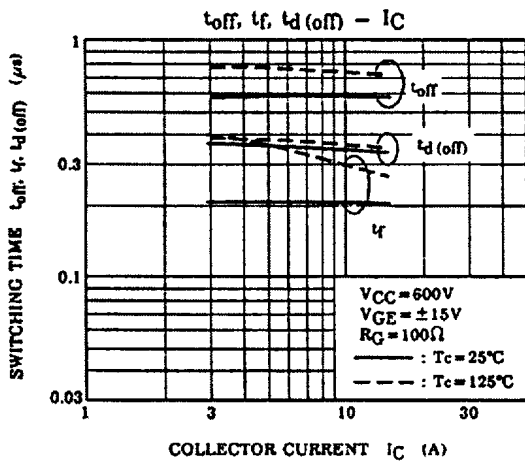
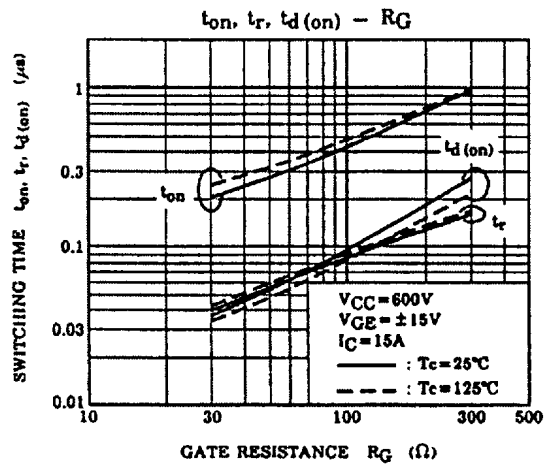
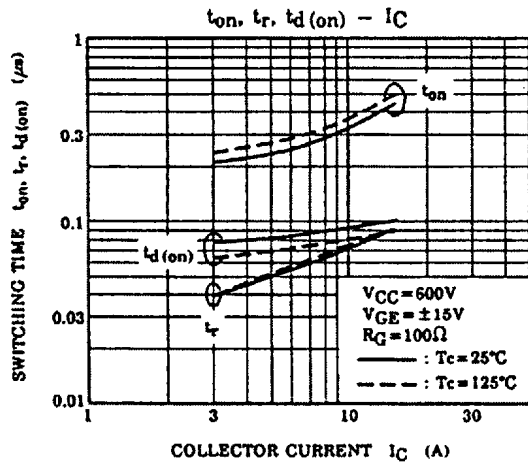
Note. 1 Switching Time Test Circuit & Timing Chart



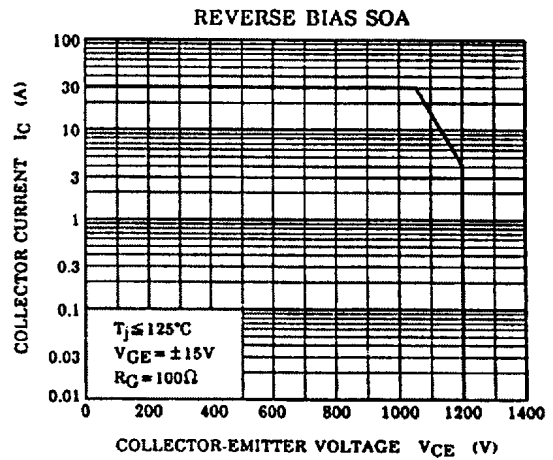
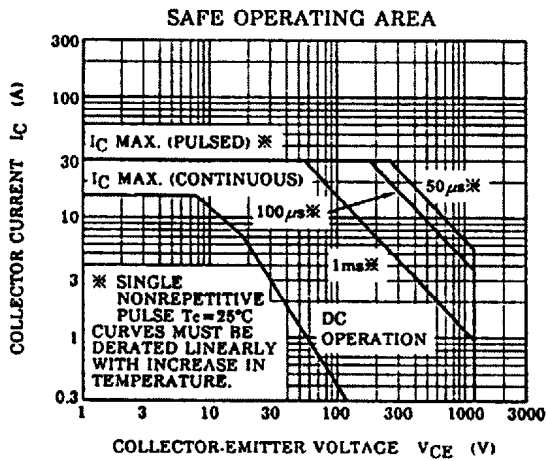
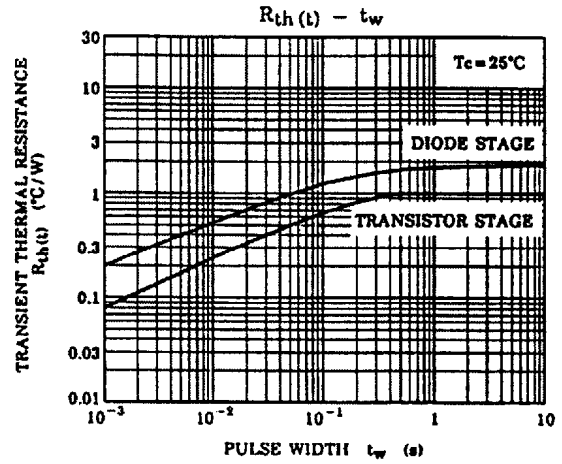
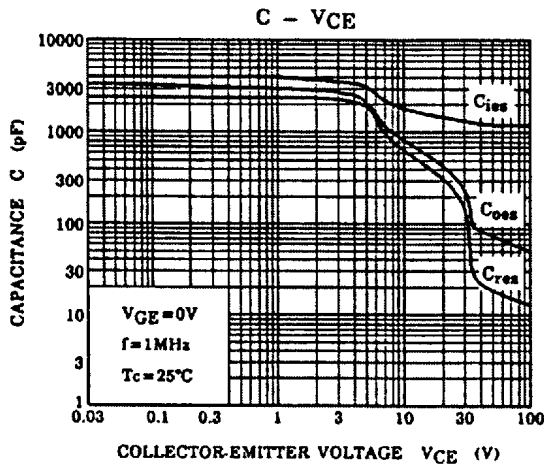
a. Inverter Stage



a. Inverter Stage

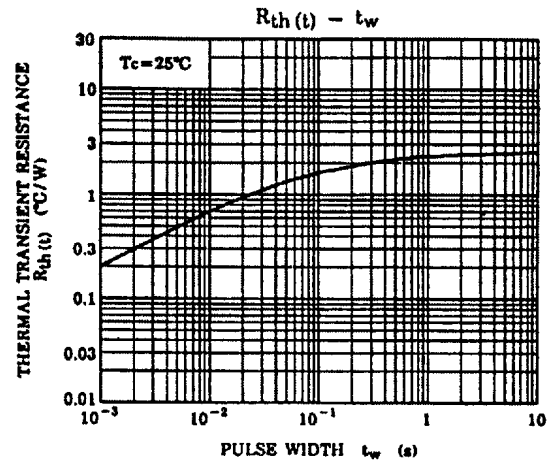
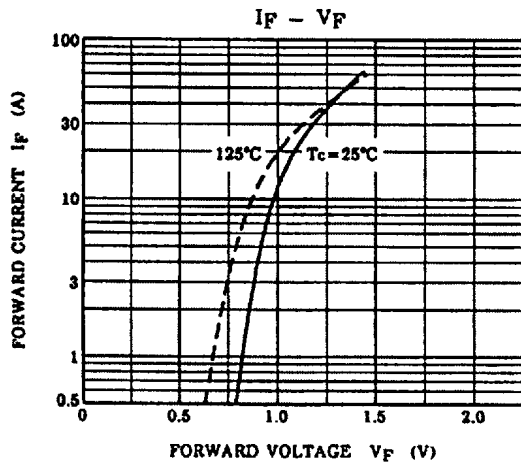


a. Inverter Stage

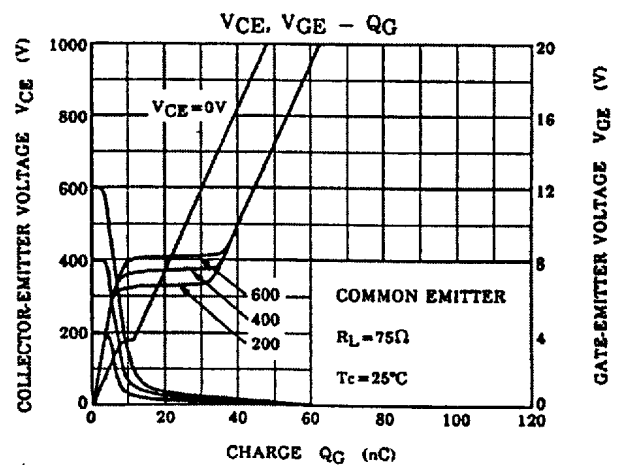
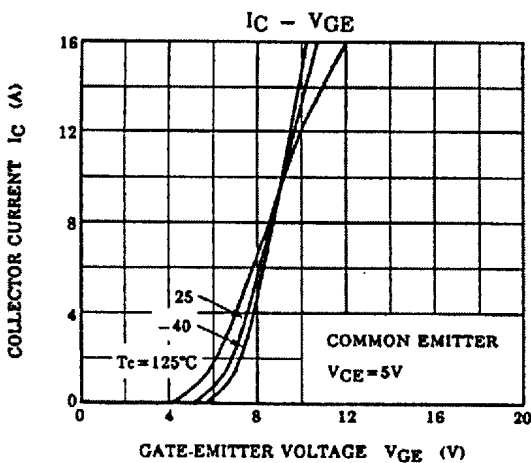
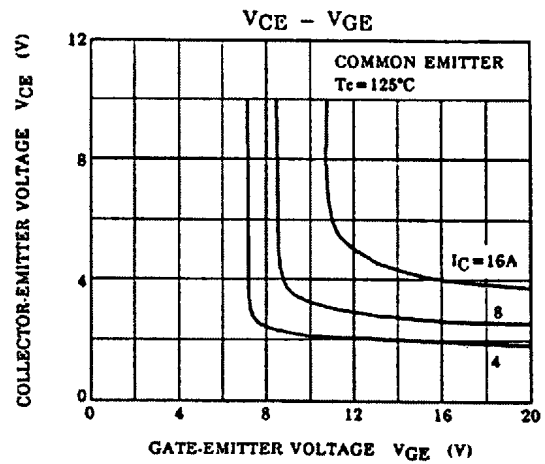
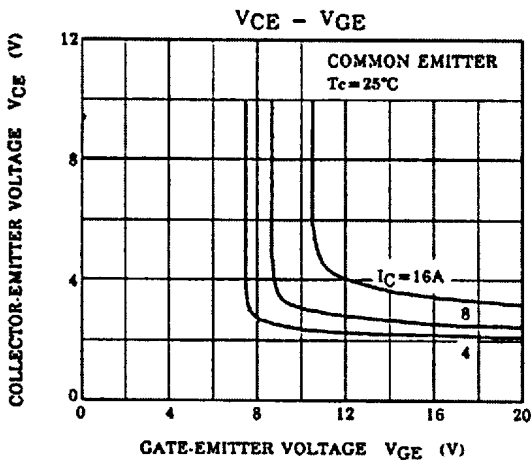
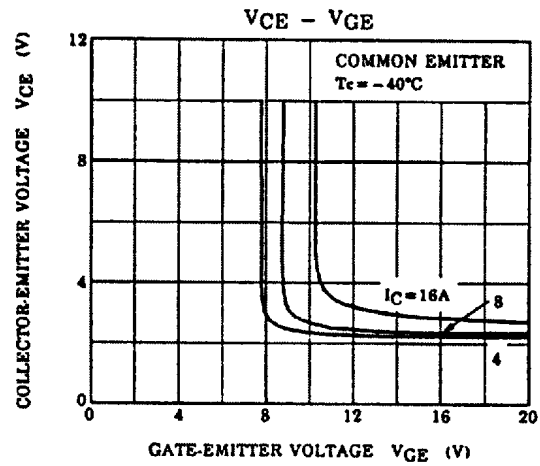
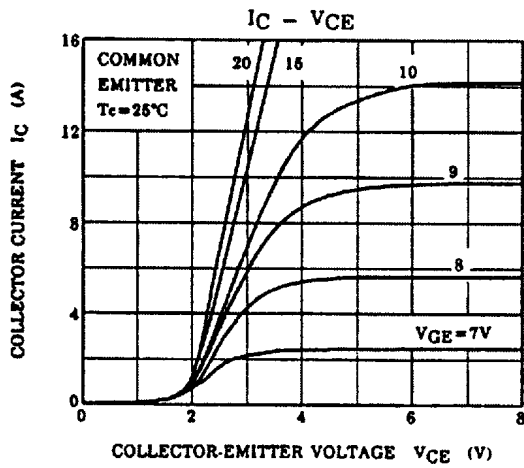


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b. Converter Stage

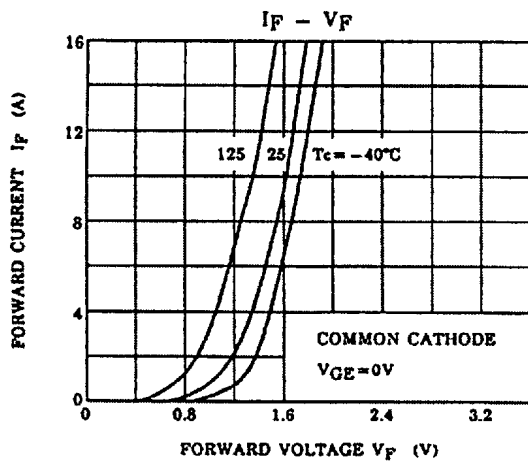
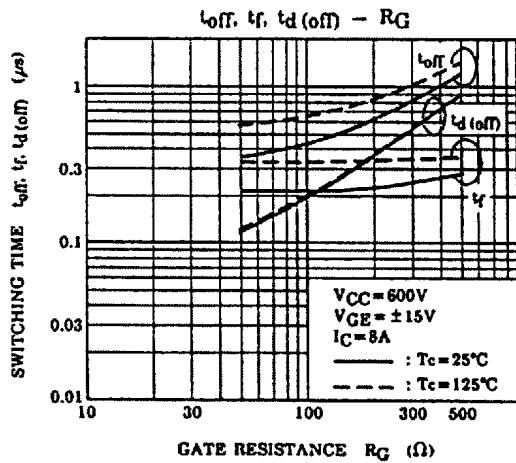
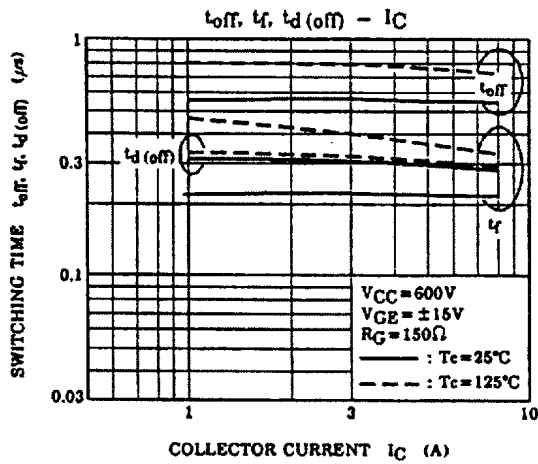
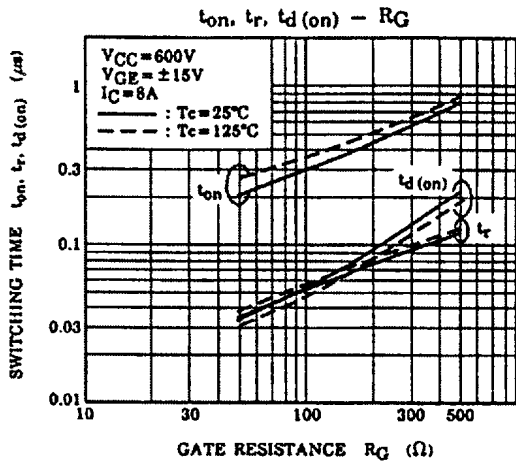
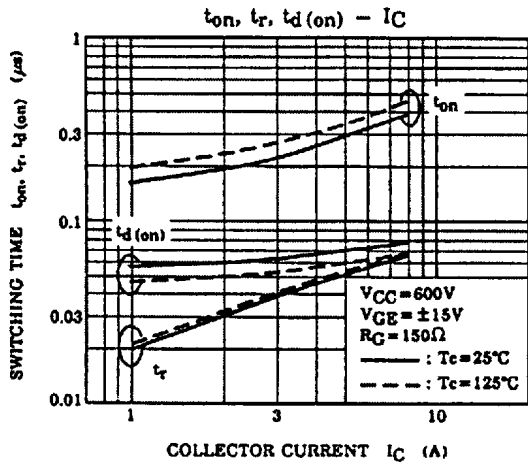


c. Brake Stage



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c. Brake Stage



c. Brake Stage

