

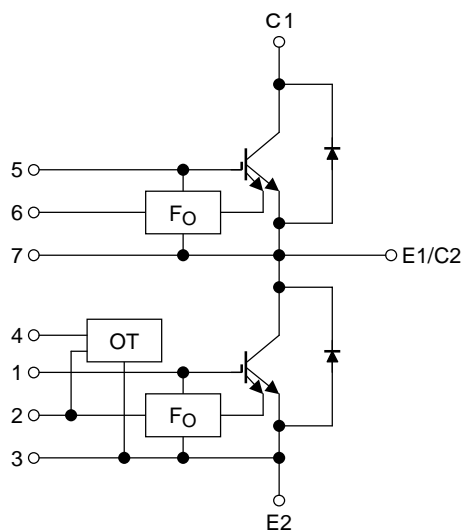
MG300Q2YS60A(1200V/300A 2in1)

High Power Switching Applications

Motor Control Applications

- Integrates a complete half bridge power circuit and fault-signal output circuit in one package.
(short circuit and over temperature)
- The electrodes are isolated from case.
- Low thermal resistance
- $V_{CE(sat)} = 2.4 \text{ V (typ.)}$

Equivalent Circuit

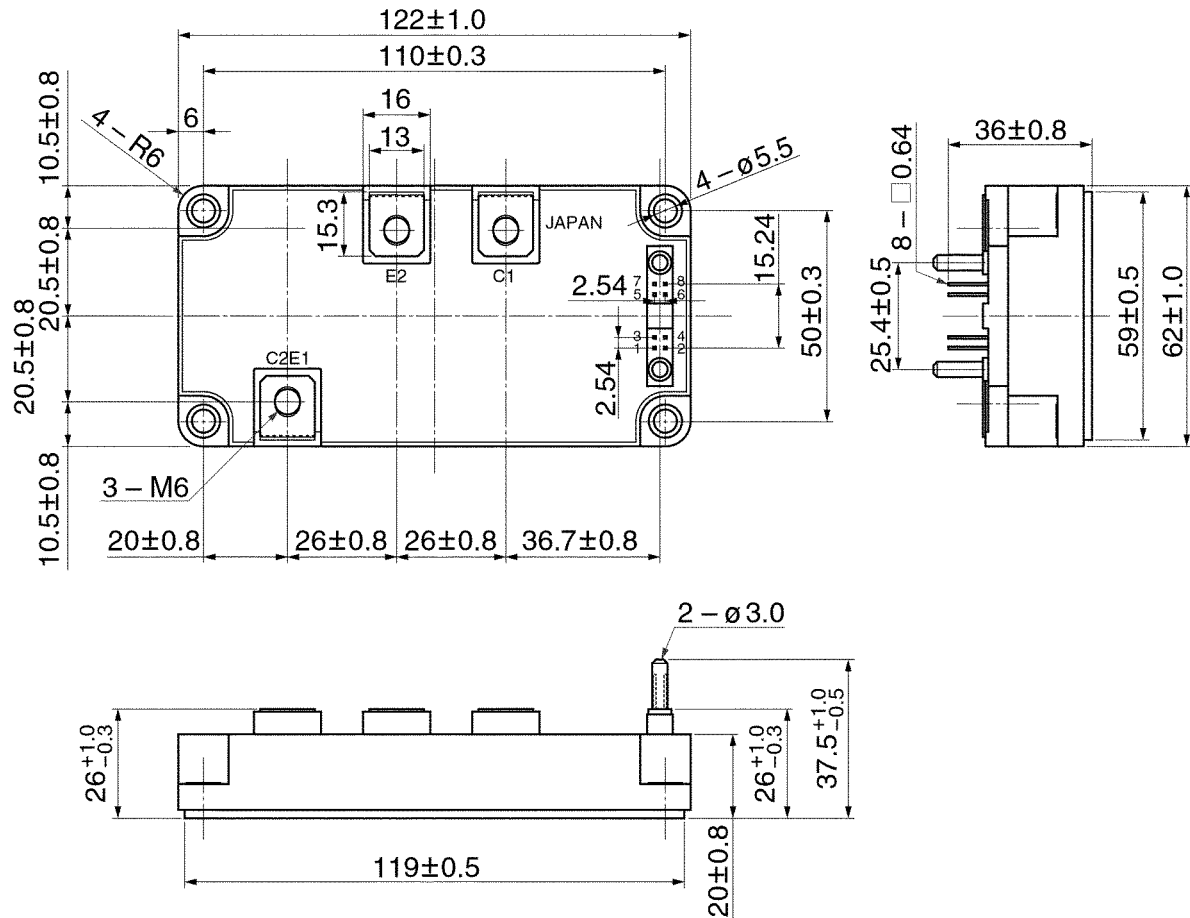


Signal terminal

1.	G (L)	2.	F _O (L)	3.	E (L)	4.	V _D
5.	G (H)	6.	F _O (H)	7.	E (H)	8.	Open

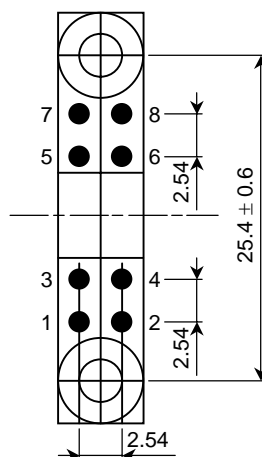
Package Dimensions: 2-123C1B

Unit: mm



- | | | | | | | | |
|----|-------|----|--------------------|----|-------|----|----------------|
| 1. | G (L) | 2. | F _O (L) | 3. | E (L) | 4. | V _D |
| 5. | G (H) | 6. | F _O (H) | 7. | E (H) | 8. | Open |

Signal Terminal Layout



- | | | | | | | | |
|----|-------|----|--------------------|----|-------|----|----------------|
| 1. | G (L) | 2. | F _O (L) | 3. | E (L) | 4. | V _D |
| 5. | G (H) | 6. | F _O (H) | 7. | E (H) | 8. | Open |

Weight: 375 g

Maximum Ratings (Ta = 25°C)

Stage	Characteristics		Symbol	Rating	Unit
Inverter	Collector-emitter voltage		V_{CES}	1200	V
	Gate-emitter voltage		V_{GES}	± 20	V
	Collector current	DC	I_C	300	A
		1 ms	I_{CP}	600	
	Forward current	DC	I_F	300	A
		1 ms	I_{FM}	600	
	Collector power dissipation ($T_c = 25^{\circ}\text{C}$)		P_C	2800	W
Control	Control voltage (OT)		V_D	20	V
	Fault input voltage		V_{FO}	20	V
	Fault input current		I_{FO}	20	mA
Module	Junction temperature		T_j	150	$^{\circ}\text{C}$
	Storage temperature range		T_{stg}	$-40\sim 125$	$^{\circ}\text{C}$
	Operation temperature range		T_{ope}	$-20\sim 100$	$^{\circ}\text{C}$
	Isolation voltage		V_{isol}	2500 (AC 1 min)	V
	Screw torque		—	3 (M5)	$\text{N}\cdot\text{m}$

Electrical Characteristics (Tj = 25°C)

1. Inverter Stage

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GES}		$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	+3/-4	mA
			$V_{GE} = +10 \text{ V}, V_{CE} = 0$	—	—	100	nA
Collector cut-off current	I_{CES}		$V_{CE} = 1200 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage	$V_{GE} \text{ (off)}$		$V_{CE} = 5 \text{ V}, I_C = 300 \text{ mA}$	6.0	7.0	8.0	V
Collector-emitter saturation voltage	$V_{CE} \text{ (sat)}$		$V_{GE} = 15 \text{ V}, I_C = 300 \text{ A}$	—	2.4	2.8	V
			$T_j = 125^\circ\text{C}$		—	3.2	
Input capacitance	C_{ies}		$V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$	—	21000	—	pF
Switching time	Turn-on delay time	$t_d \text{ (on)}$	$V_{CC} = 600 \text{ V}, I_C = 300 \text{ A}$ $V_{GE} = \pm 15 \text{ V}, R_G = 6.8 \Omega$ (Note 1)	0.10	—	1.00	μs
	Turn-off time	t_{off}		—	—	2.00	
	Fall time	t_f		—	—	0.50	
	Reverse recovery time	t_{rr}		—	—	0.50	
Forward voltage	V_F		$I_F = 300 \text{ A}$	—	2.1	2.6	V

Note 1: Switching time test circuit & timing chart

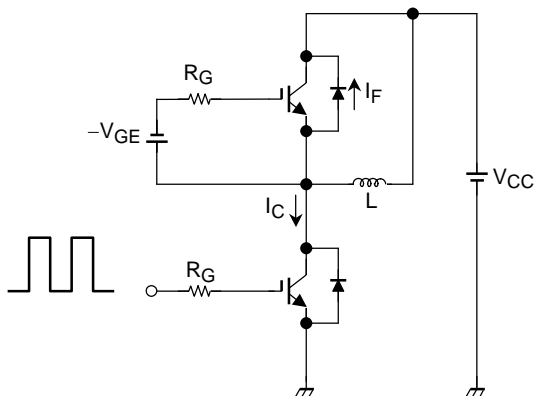
2. Control (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Fault output current	OC	$V_{GE} = 15 \text{ V}$	360	—	—	A
Over temperature	OT	—	100	—	125	°C
Fault output delay time	$t_d \text{ (Fo)}$	$V_{CC} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}$	—	—	8	μs

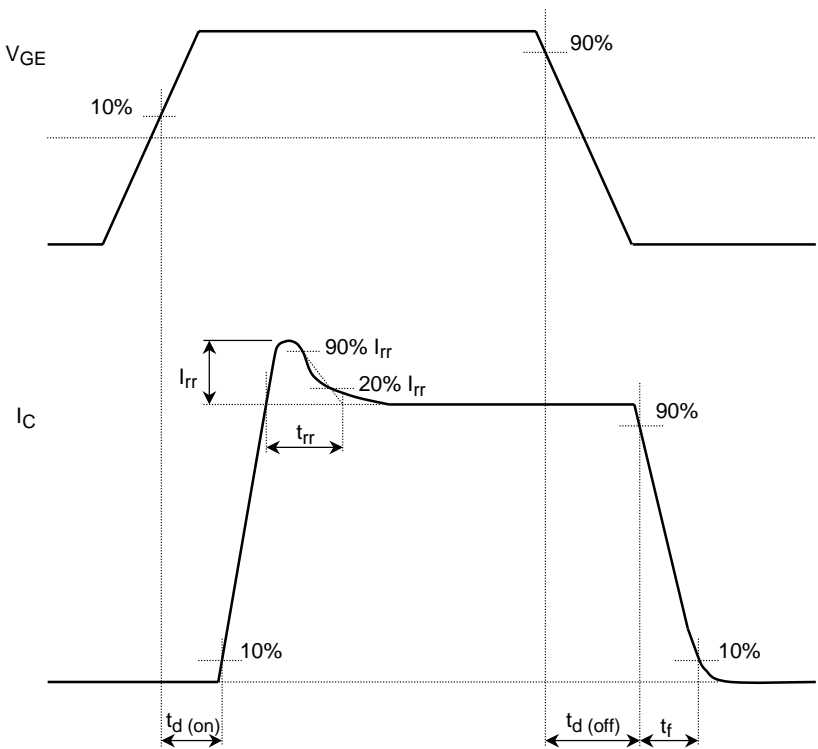
3. Module (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	$R_{th(j-c)}$	Inverter IGBT stage	—	—	0.044	°C/W
		Inverter FRD stage	—	—	0.068	
Case to fin thermal resistance	$R_{th(c-f)}$	With silicon compound	—	0.013	—	°C/W

Switching Time Test Circuit



Timing Chart

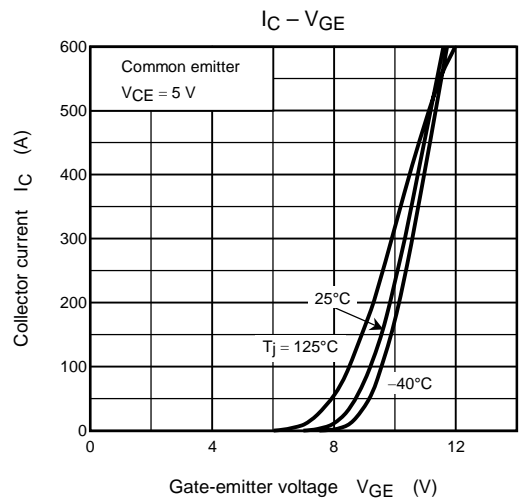
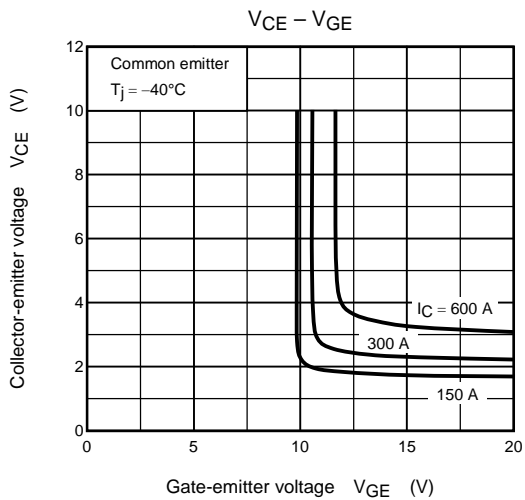
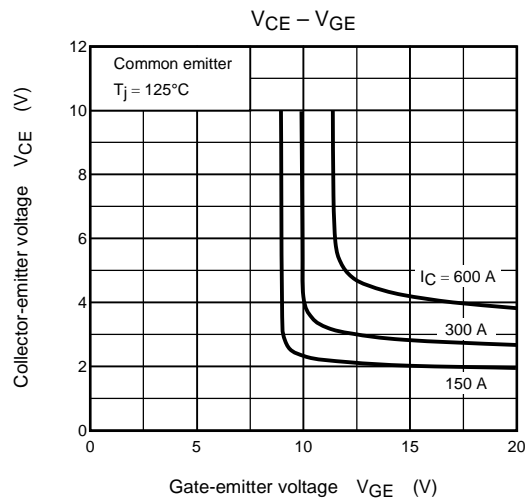
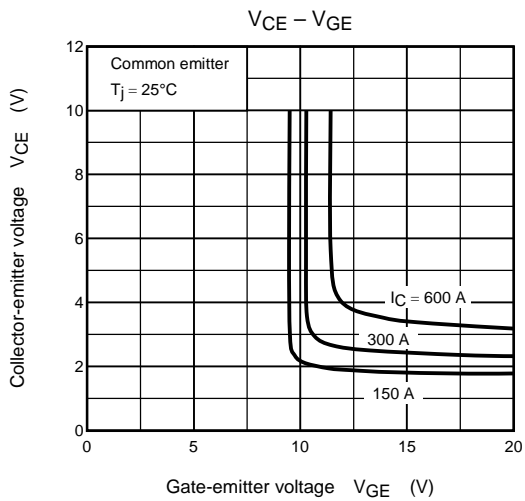
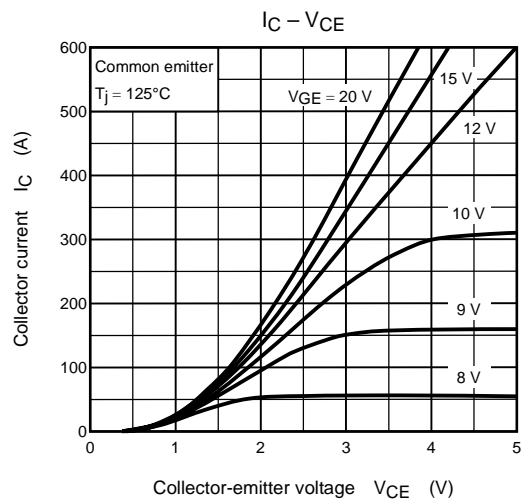
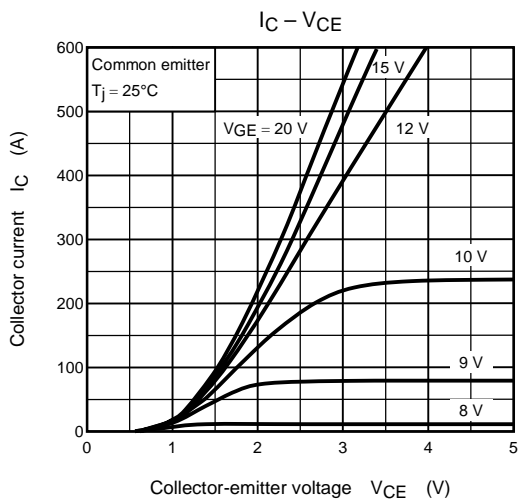


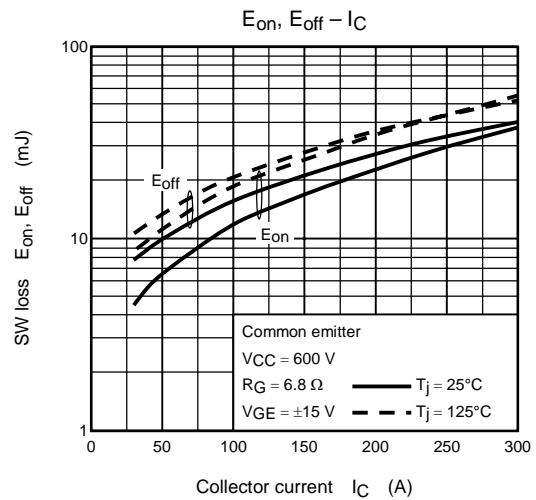
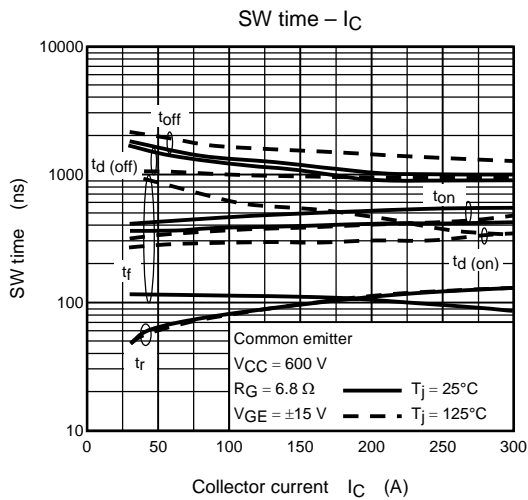
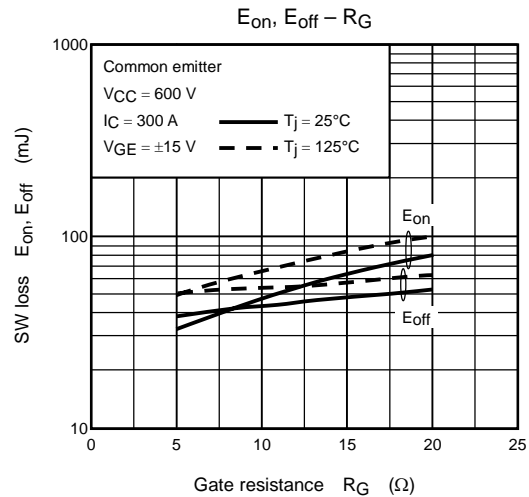
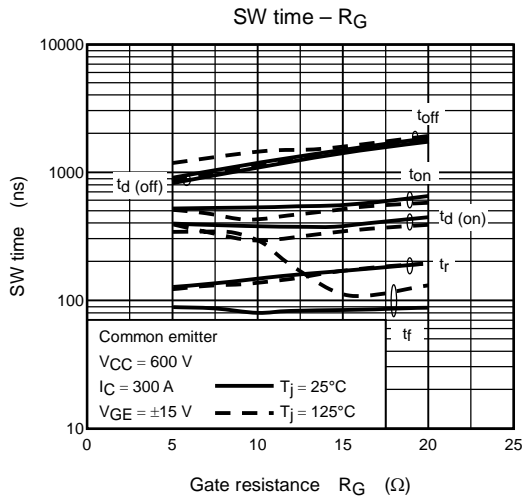
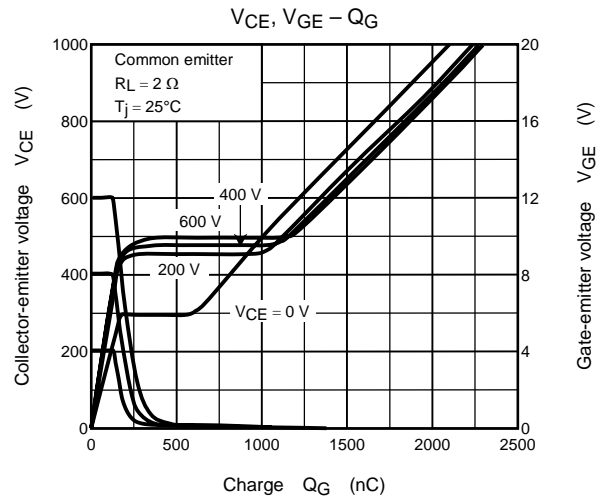
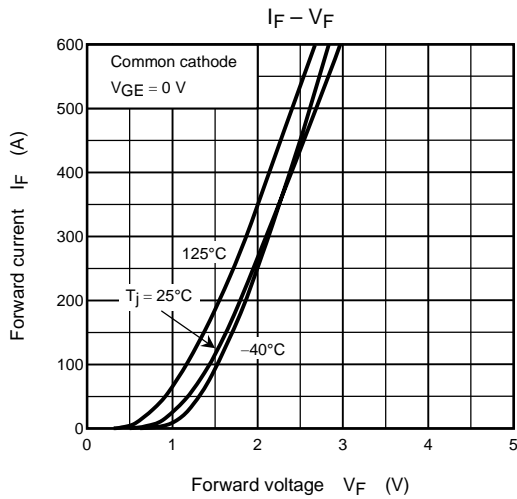
Remark**<Short circuit capability condition>**

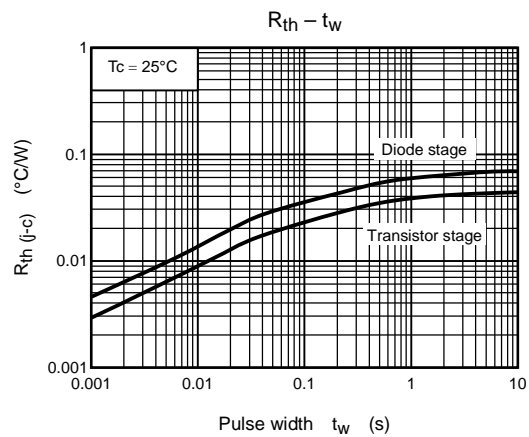
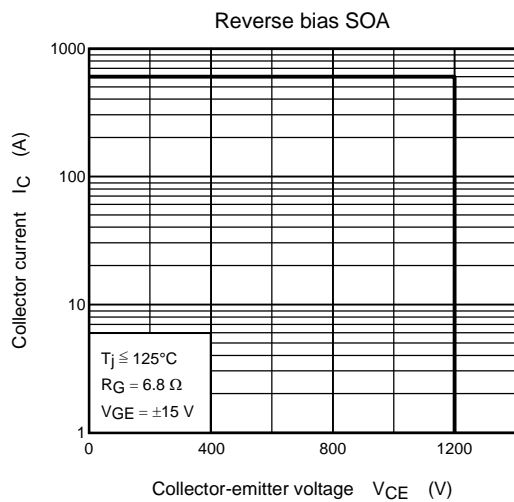
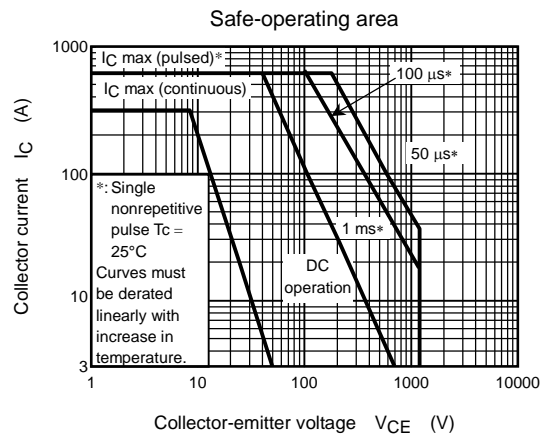
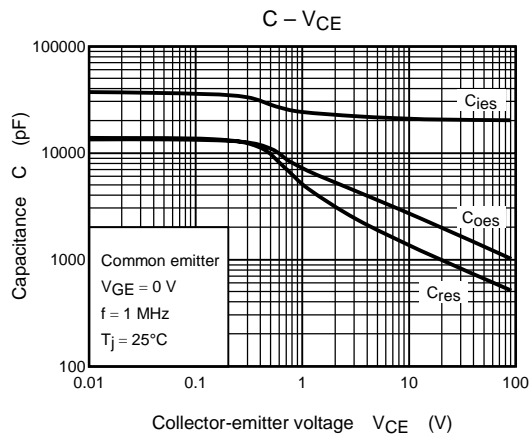
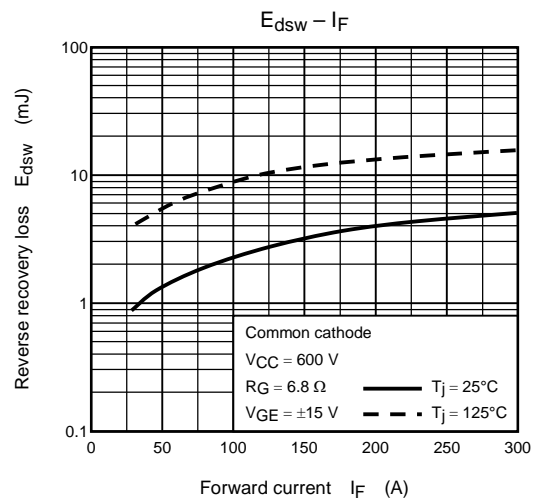
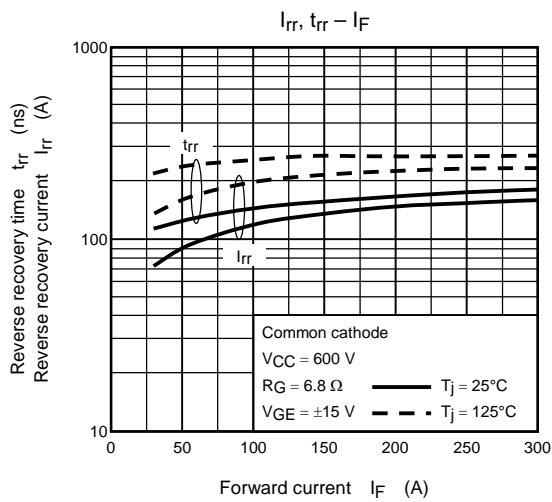
- Short circuit capability is 6 μ s after fault output signal.
Please keep following condition to use fault output signal.
 - $V_{CC} \leq 750 \text{ V}$
 - $14.8 \text{ V} \leq V_{GE} \leq 17.0 \text{ V}$
 - $R_G \geq 6.8 \text{ } \Omega$
 - $T_j \leq 125^\circ\text{C}$

<Gate voltage>

- To use this product, V_{GE} must be provided higher than 14.8 V.
In case V_{GE} is less than 14.8 V, fault signal FO may not be output even under error conditions.







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