

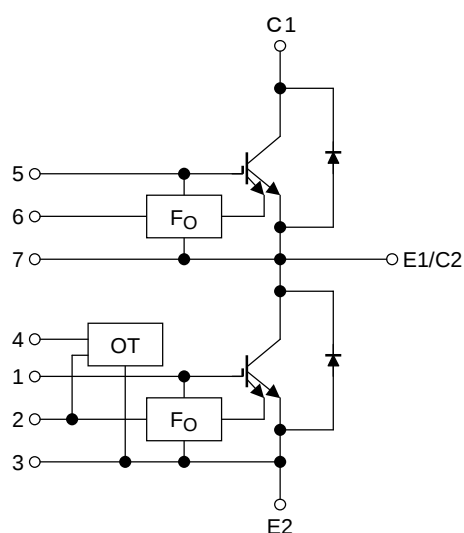
MG400J2YS60A(600V/400A 2in1)

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
- $V_{CE(sat)} = 1.8 \text{ V (typ.)}$

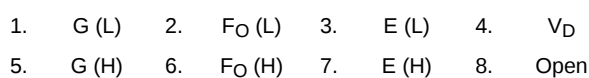
Equivalent Circuit



Signal terminal

1.	G (L)	2.	FO (L)	3.	E (L)	4.	V_D
5.	G (H)	6.	FO (H)	7.	E (H)	8.	Open

Unit: mm



Technical drawing of a 4x4 grid of holes. The grid is composed of 16 circular holes arranged in 4 rows and 4 columns. The overall width of the grid is 25.4 ± 0.6. The overall height of the grid is 25.4. The distance between the centers of adjacent holes in both the horizontal and vertical directions is 2.54. The drawing includes dimension lines and numerical values indicating these measurements.

- | | | | | | | | |
|----|-------|----|--------------------|----|-------|----|----------------|
| 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}	600	V
	Gate-emitter voltage		V_{GES}	± 20	V
	Collector current	DC	I_C	400	A
		1 ms	I_{CP}	800	
	Forward current	DC	I_F	400	A
		1 ms	I_{FM}	800	
	Collector power dissipation (Tc = 25°C)		P_C	2160	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	°C
	Storage temperature range		T_{stg}	-40~125	°C
	Operation temperature range		T_{ope}	-20~100	°C
	Isolation voltage		V_{isol}	2500 (AC 1 min)	V
	Screw torque		—	3 (M5)	N·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}	$V_{CE} = 600 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE} \text{ (off)}$	$V_{CE} = 5 \text{ V}, I_C = 400 \text{ mA}$	5.0	6.5	8.0	V
Collector-emitter saturation voltage		$V_{CE} \text{ (sat)}$	$V_{GE} = 15 \text{ V}, I_C = 400 \text{ A}$	—	1.8	2.1	V
			$T_j = 125^\circ\text{C}$		—	2.3	
Input capacitance		C_{ies}	$V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$	—	3500	—	pF
Switching time	Turn-on delay time	$t_d \text{ (on)}$	$V_{CC} = 300 \text{ V}, I_C = 400 \text{ A}$ $V_{GE} = \pm 15 \text{ V}, R_G = 7.5 \Omega$ (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	$I_F = 400 \text{ A}$	—	1.8	2.2	V

Note 1: Switching time test circuit & timing chart

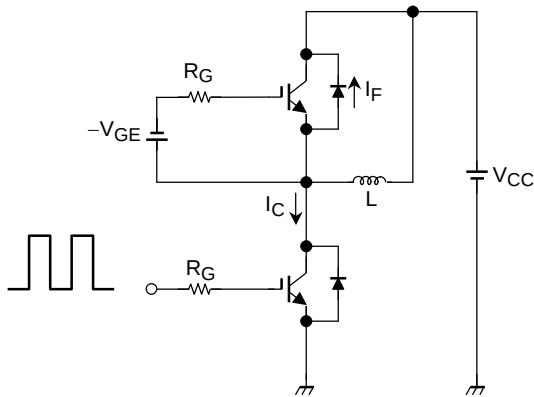
2. Control (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Fault output current	OC	$V_{GE} = 15 \text{ V}$	480	—	—	A
Over temperature	OT	—	100	—	125	°C
Fault output delay time	$t_d \text{ (Fo)}$	$V_{CC} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}$	—	—	6.5	μs

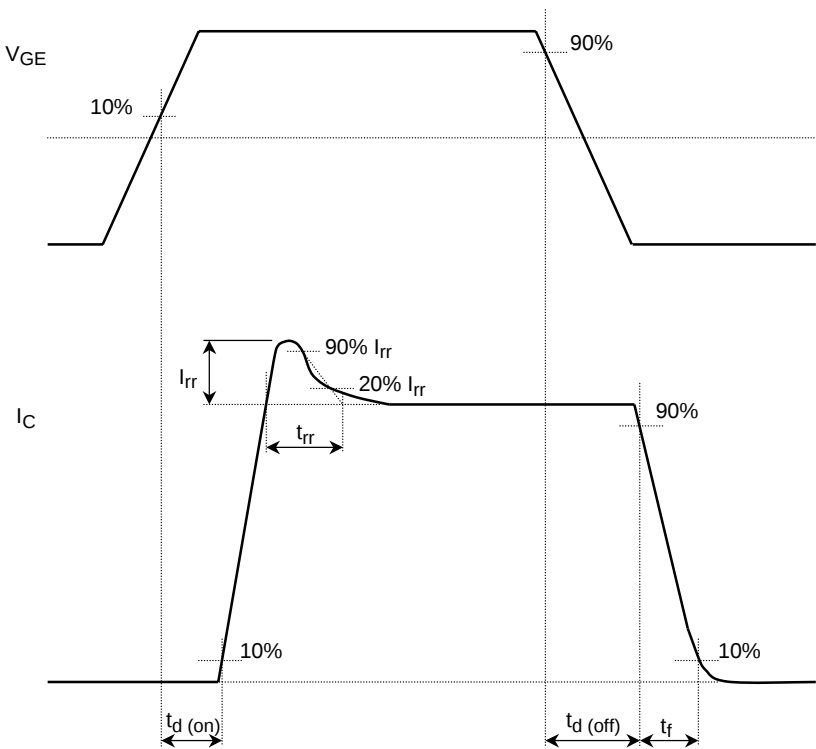
3. Module (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Junction to case thermal resistance	R _{th (j-c)}	Inverter IGBT stage	—	—	0.057	°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

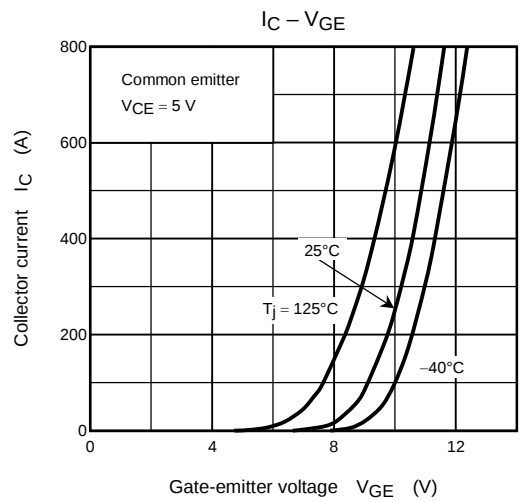
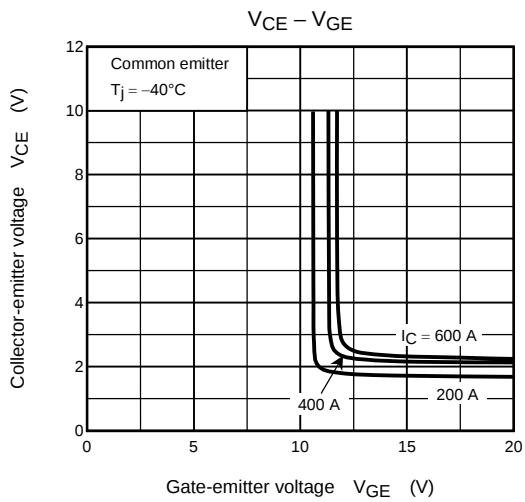
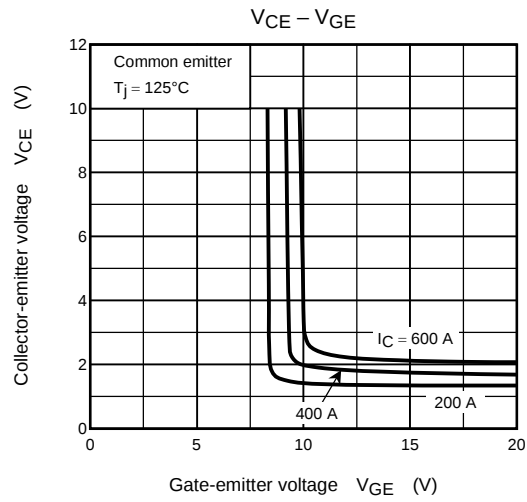
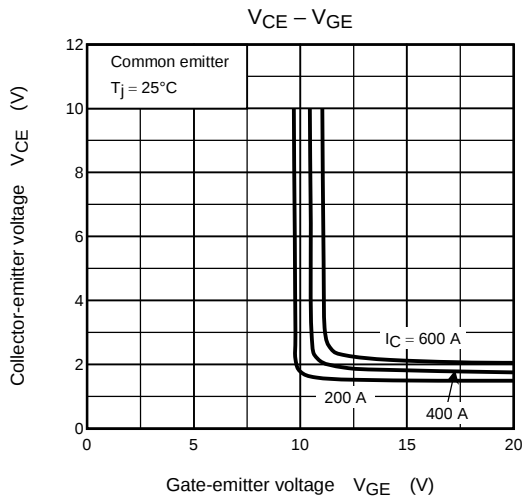
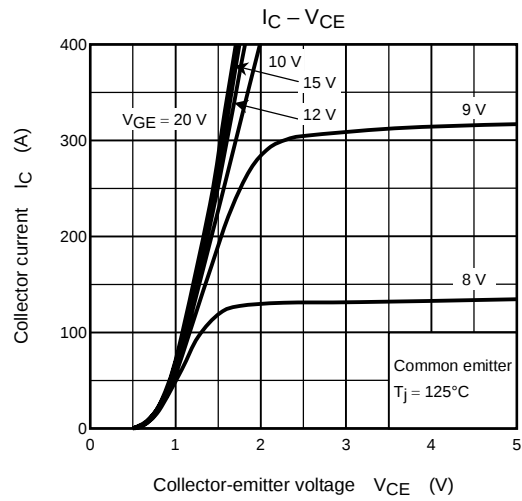
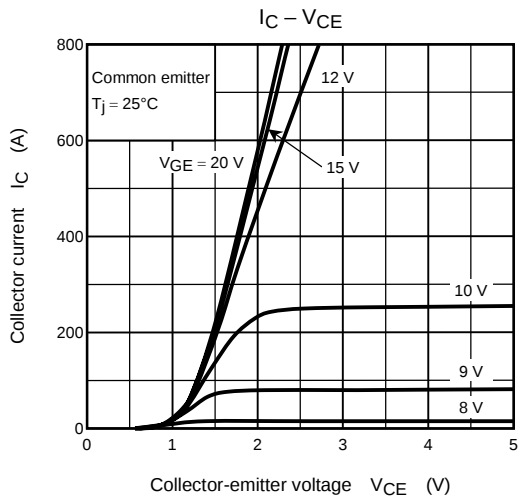


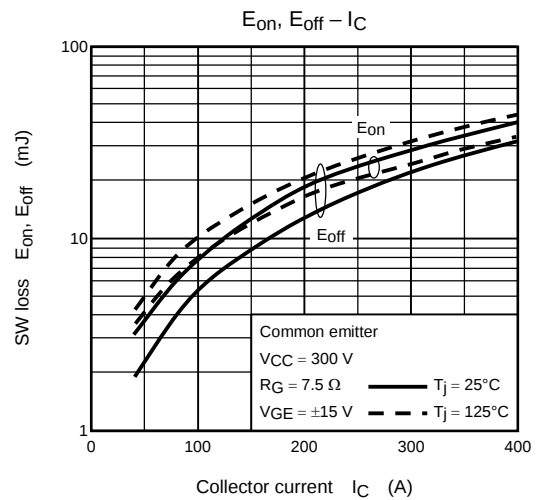
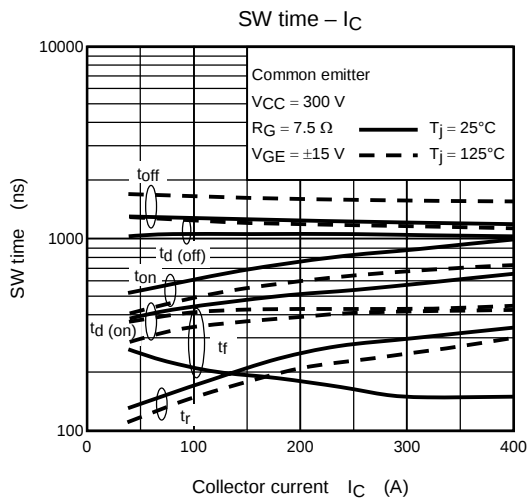
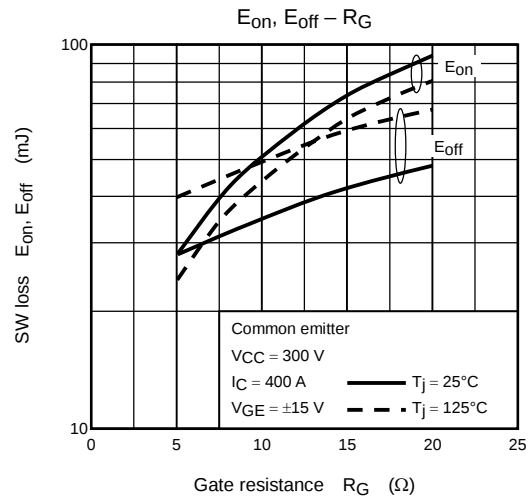
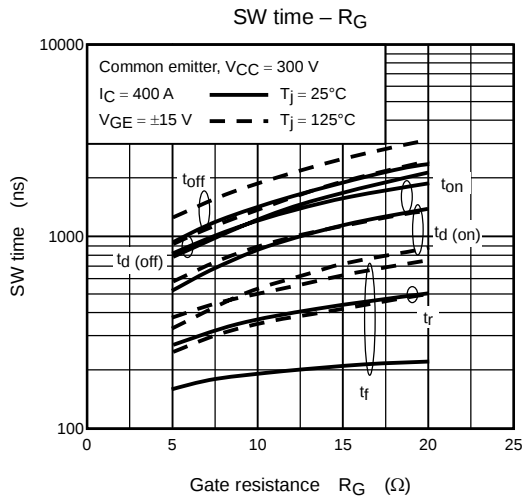
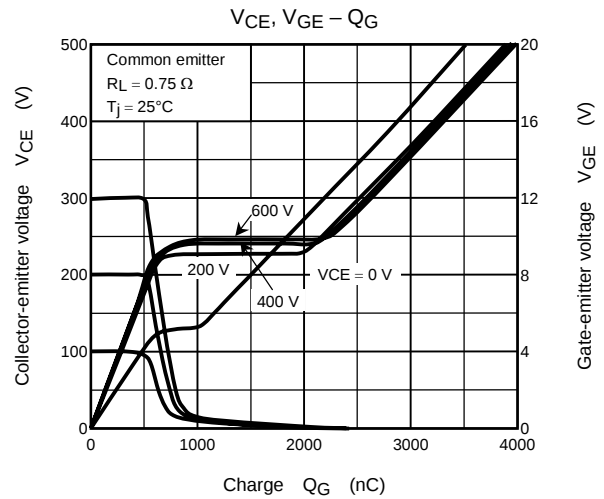
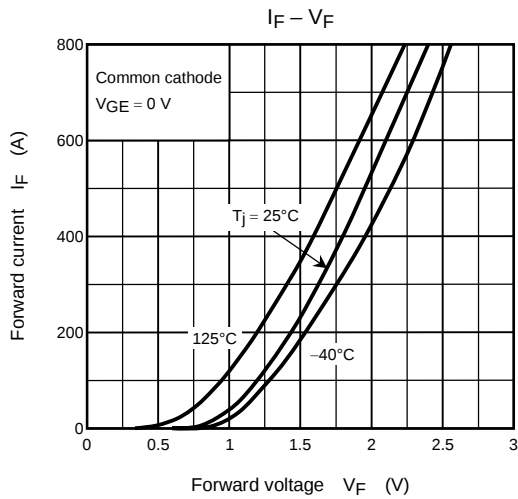
Remark**<Short circuit capability condition>**

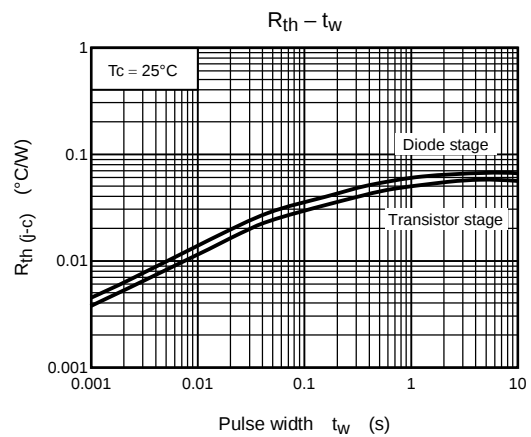
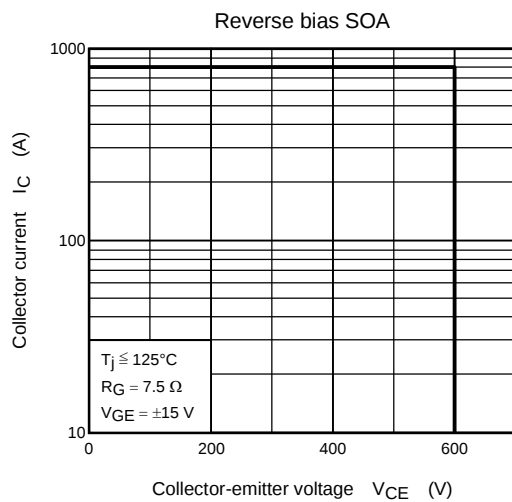
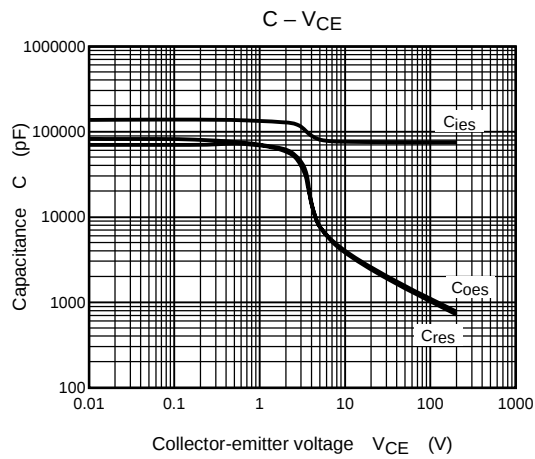
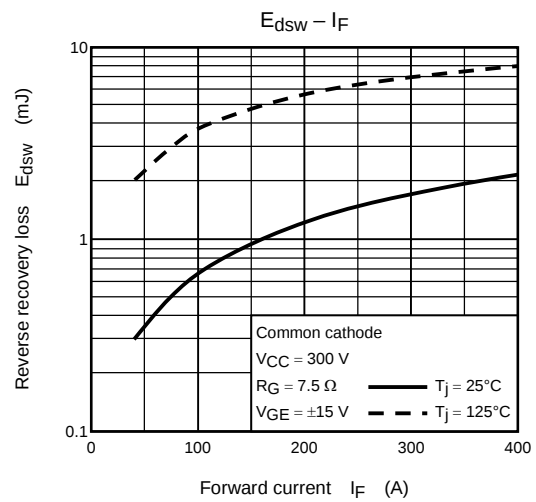
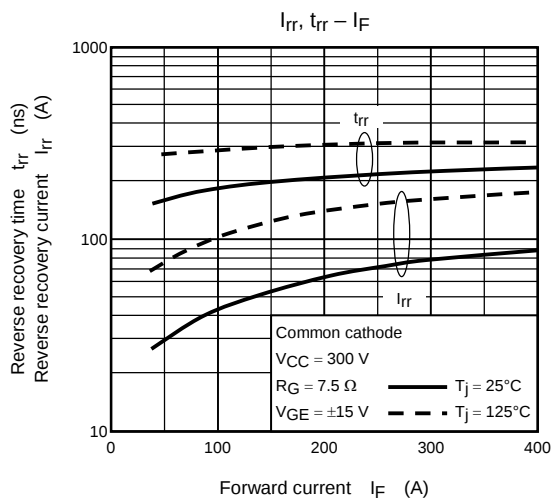
- Short circuit capability is 6 μ s after fault output signal.
Please keep following condition to use fault output signal.
 - $V_{CC} \leq 375 \text{ V}$
 - $13.8 \text{ V} \leq V_{GE} \leq 16.0 \text{ V}$
 - $R_G \geq 7.5 \Omega$
 - $T_j \leq 50^\circ\text{C}$

<Gate voltage>

- To use this product, V_{GE} must be provided higher than 13.8 V.
In case V_{GE} is less than 13.8 V, fault signal FO may not be output even under error conditions.







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