

TOSHIBA

MIG100Q6CMA0X

TOSHIBA INTELLIGENT POWER MODULE SILICON N CHANNEL IGBT

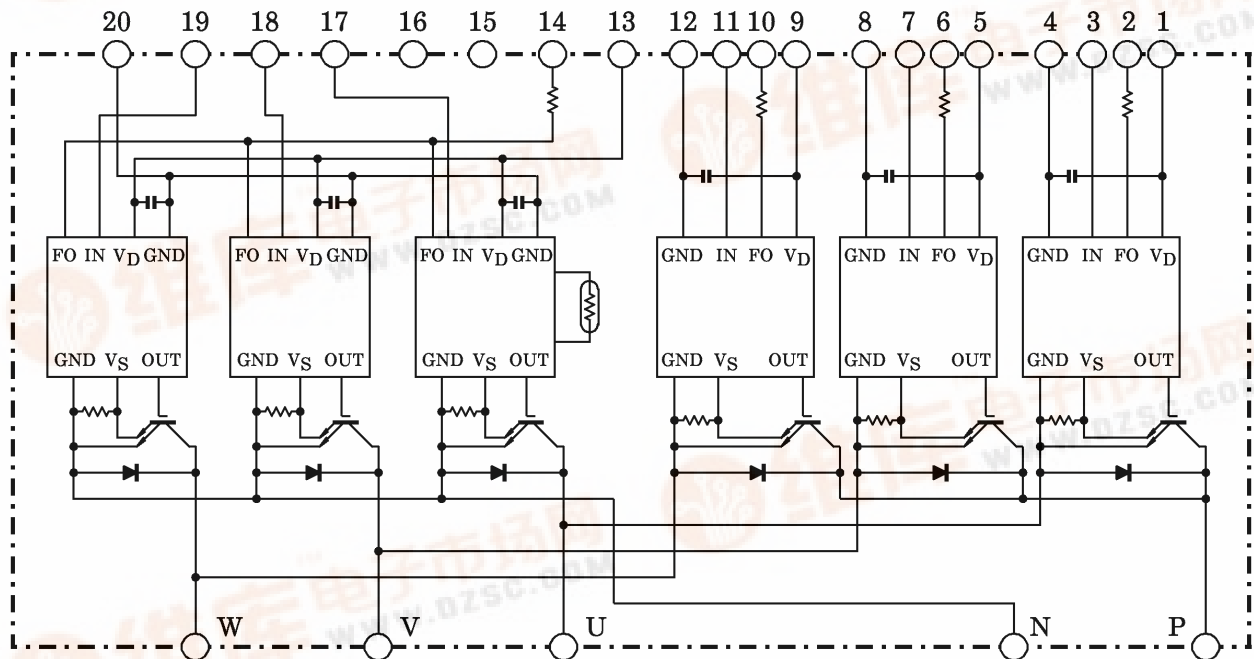
MIG100Q6CMA0X (1200V / 100A 6in1)

HIGH POWER SWITCHING APPLICATION

MOTOR CONTROL APPLICATION

- Integrates Inverter Power Circuits & Control Circuits (IGBT drive units, Protection units for Short-Current, Over-Current, Under-Voltage & Over Temperature) in One Package.
- The Electrode are Isolated from Case.
- $V_{CE(sat)} = 2.4\text{ V (Typ.)}$

EQUIVALENT CIRCUIT



- | | | | | | | |
|--------------|--------------|------------|------------|--------------|---------------|------------|
| 1. V_D (U) | 2. FO (U) | 3. IN (U) | 4. GND (U) | 5. V_D (V) | 6. FO (V) | 7. IN (V) |
| 8. GND (V) | 9. V_D (W) | 10. FO (W) | 11. IN (W) | 12. GND (W) | 13. V_D (L) | 14. FO (L) |
| 15. Open | 16. Open | 17. IN (X) | 18. IN (Y) | 19. IN (Z) | 20. GND (L) | |

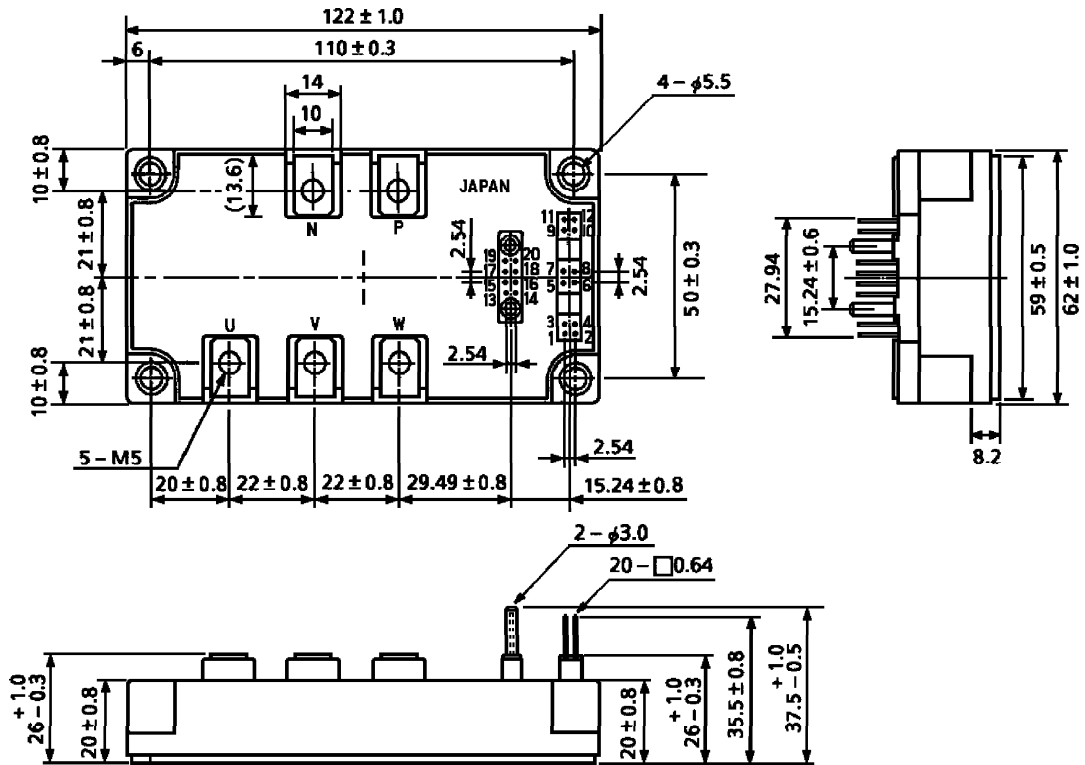
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OUTLINE : TOSHIBA 2-123A1A

Unit : mm

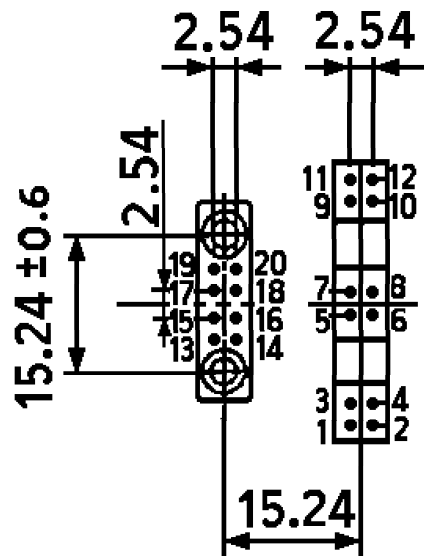


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|------------------------|------------|-----------------------|-----------|-----------------------|------------|
| 1. V _D (U) | 2. FO(U) | 3. IN(U) | 4. GND(U) | 5. V _D (V) | 6. FO(V) |
| 7. IN(V) | 8. GND(V) | 9. V _D (W) | 10. FO(W) | 11. IN(W) | 12. GND(W) |
| 13. V _D (L) | 14. FO(L) | 15. Open | 16. Open | 17. IN(X) | 18. IN(Y) |
| 19. IN(Z) | 20. GND(L) | | | | |

Weight : 375 g (Typ.)

SIGNAL TERMINAL LAYOUT

Unit : mm



- | | | | | | |
|------------------------|------------|-----------------------|-----------|-----------------------|------------|
| 1. V _D (U) | 2. FO(U) | 3. IN(U) | 4. GND(U) | 5. V _D (V) | 6. FO(V) |
| 7. IN(V) | 8. GND(V) | 9. V _D (W) | 10. FO(W) | 11. IN(W) | 12. GND(W) |
| 13. V _D (L) | 14. FO(L) | 15. Open | 16. Open | 17. IN(X) | 18. IN(Y) |
| 19. IN(Z) | 20. GND(L) | | | | |

MAXIMUM RATINGS

STAGE	CHARACTERISTIC	CONDITION	SYMBOL	RATING	UNIT
Inverter	Supply Voltage	P-N Power Terminal	V _{CC}	900	V
	Collector-Emitter Voltage	—	V _{CES}	1200	V
	Collector Current	T _c = 25°C, DC	I _C	100	A
	Forward Current	T _c = 25°C, DC	I _F	100	A
	Collector Power Dissipation	T _c = 25°C	P _C	600	W
	Junction Temperature	—	T _j	150	°C
Control	Control Supply Voltage	V _D -GND Terminal	V _D	20	V
	Input Voltage	IN-GND Terminal	V _{IN}	20	V
	Fault Output Voltage	FO-GND Terminal	V _{FO}	20	V
	Fault Output Current	FO Sink Current	I _{FO}	14	mA
Module	Operating Temperature	—	T _c	-20~+100	°C
	Storage Temperature Range	—	T _{stg}	-40~+125	°C
	Isolation Voltage	AC 1 minute	V _{ISO}	2500	V
	Screw Torque	M5	—	3	Nm

ELECTRICAL CHARACTERISTICS

a. Inverter Stage (T_j = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Collector Cut-Off Current	I _{CEX}	V _{CE} = 1200 V	T _j = 25°C	—	—	1	mA
			T _j = 125°C	—	—	10	
Collector-Emitter Saturation Voltage	V _{CE (sat)}	V _D = 15 V, I _C = 100 A, V _{IN} = 15 V → 0 V	T _j = 25°C	—	2.4	2.8	V
			T _j = 125°C	—	—	3.2	
Forward Voltage	V _F	I _F = 100 A	—	2.5	3.1	V	
Switching Time	t _{on}	V _{CC} = 600 V, I _C = 100 A V _D = 15 V, V _{IN} = 15 V ↔ 0 V Inductive Load (Note 1)	—	1.0	2.0	μs	
	t _{c (on)}		—	0.6	1.2		
	t _{rr}		—	0.3	0.6		
	t _{off}		—	2.0	3.0		
	t _{c (off)}		—	0.3	0.7		

b. Control Stage ($T_j = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Circuit Current	High Side	$I_D(H)$	$V_D = 15\text{ V}$	—	8	12	mA
	Low Side	$I_D(L)$		—	34	50	
Input On Signal Voltage		$V_{IN(on)}$	$V_D = 15\text{ V}$	1.4	1.6	1.8	V
Input Off Signal Voltage		$V_{IN(off)}$	—	2.2	2.5	2.8	
Fault Output Current	Protection	$I_{FO(on)}$	$V_D = 15\text{ V}$	—	10	12	mA
	Normal	$I_{FO(off)}$		—	—	0.1	
Over Current Protection Trip Level	Inverter	OC	$V_D = 15\text{ V}, T_j \leq 125^\circ\text{C}$	160	—	—	A
Short Circuit Protection Trip Level	Inverter	SC	$V_D = 15\text{ V}, T_j \leq 125^\circ\text{C}$	200	—	—	A
Over Current Cut-Off Time		$t_{off(OC)}$	$V_D = 15\text{ V}$	—	5	—	μs
Over Temperature Protection	Trip Level	OT	Case Temperature	110	118	125	$^\circ\text{C}$
	Reset Level	OTr		—	98	—	
Control Supply Under Voltage Protection	Trip Level	UV	—	11.0	12.0	12.5	V
	Reset Level	UVr		12.0	12.5	13.0	
Fault Output Pulse Width		t_{FO}	$V_D = 15\text{ V}$	1	2	3	ms

c. Thermal Resistance ($T_c = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Junction to Case Thermal Resistance	$R_{th(j-c)}$	IGBT	—	—	0.208	$^\circ\text{C/W}$
		FRD	—	—	0.50	

(Note 1) : Switching time test circuit & timing chart

