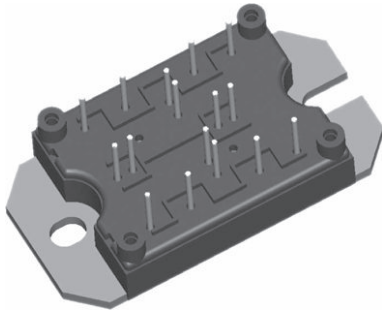



“Full Bridge” IGBT MTP (Warp Speed IGBT), 50 A



MTP


RoHS
COMPLIANT

FEATURES

- Gen 4 warp speed IGBT technology
- HEXFRED® antiparallel diodes with ultrasoft reverse recovery
- Very low conduction and switching losses
- Optional SMT thermistor
- Al₂O₃ DBC
- Very low stray inductance design for high speed operation
- Speed 8 kHz to 30 kHz > 20 kHz hard switching, > 200 kHz resonant mode
- UL approved file E78996 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

BENEFITS

- Optimized for welding, UPS and SMPS applications
- Low EMI, requires less snubbing
- Direct mounting to heatsink
- PCB solderable terminals
- Very low junction to case thermal resistance

PRODUCT SUMMARY

V _{CES}	600 V
I _C DC	69 A
V _{CE(on)}	2.22 V
Speed	8 kHz to 30 kHz
Package	MTP
Circuit	Full bridge

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V _{CES}		600	V
Continuous collector current	I _C	T _C = 25 °C	69	A
		T _C = 80 °C	46	
Pulsed collector current	I _{CM}		200	
Peak switching current	I _{LM}		200	
Diode continuous forward current	I _F	T _C = 100 °C	25	
Peak diode forward current	I _{FM}		200	
Gate to emitter voltage	V _{GE}		± 20	V
RMS isolation voltage	V _{ISOL}	Any terminal to case, t = 1 minute	2500	V
Maximum power dissipation per single IGBT	P _D	T _C = 25 °C	195	W
		T _C = 100 °C	78	



ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	V _{(BR)CES}	V _{GE} = 0 V, I _C = 250 μA	600	-	-	V
Temperature coefficient of breakdown voltage	ΔV _{(BR)CES} /ΔT _J	V _{GE} = 0 V, I _C = 4 mA (25 °C to 125 °C)	-	+0.6	-	V/°C
Collector to emitter saturation voltage	V _{CE(on)}	V _{GE} = 15 V, I _C = 25 A	-	2.22	3.14	V
		V _{GE} = 15 V, I _C = 50 A	-	2.43	3.25	
		V _{GE} = 15 V, I _C = 25 A, T _J = 150 °C	-	1.65	1.93	
		V _{GE} = 15 V, I _C = 50 A, T _J = 150 °C	-	2.08	2.45	
Gate threshold voltage	V _{GE(th)}	V _{CE} = V _{GE} , I _C = 250 μA	3	-	6	
Temperature coefficient of threshold voltage	ΔV _{GE(th)} /ΔT _J	V _{CE} = V _{GE} , I _C = 250 μA (25 °C to 125 °C)	-	- 17	-	mV/°C
Transconductance	g _{fe}	V _{CE} = 100 V, I _C = 25 A, PW = 80 μs	-	43	-	S
Zero gate voltage collector current	I _{CES} (1)	V _{GE} = 0 V, V _{CE} = 600 V, T _J = 25 °C	-	-	250	μA
		V _{GE} = 0 V, V _{CE} = 600 V, T _J = 150 °C	-	-	10	mA
Gate to emitter leakage current	I _{GES}	V _{GE} = ± 20 V	-	-	± 250	nA
Diode forward voltage drop	V _{FM}	I _C = 25 A	-	1.36	1.64	V
		I _C = 50 A	-	1.57	1.93	
		I _C = 25 A; T _J = 150 °C	-	1.19	1.42	
		I _C = 50 A; T _J = 150 °C	-	1.48	1.80	

Note

(1) I_{CES} includes also opposite leg overall leakage

SWITCHING CHARACTERISTICS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Total gate charge (turn-on)	Q _g	I _C = 25 A V _{CC} = 480 V V _{GE} = 15 V	-	175	263	nC	
Gate to emitter charge (turn-on)	Q _{ge}		-	27	41		
Gate to collector charge (turn-on)	Q _{gc}		-	71	107		
Turn-on switching loss	E _{on}	R _g = 5 Ω, I _C = 25 A V _{CC} = 480 V V _{GE} = ± 15 V, T _J = 25 °C	-	0.13	0.20	mJ	
Turn-off switching loss	E _{off}		-	0.42	0.62		
Total switching loss	E _{tot}		-	0.55	0.82		
Turn-on switching loss	E _{on}		R _g = 5 Ω, I _C = 25 A V _{CC} = 480 V V _{GE} = ± 15 V, T _J = 125 °C	-	0.39		0.59
Turn-off switching loss	E _{off}			-	0.49		0.74
Total switching loss	E _{tot}			-	0.88		1.32
Input capacitance	C _{ies}	V _{GE} = 0 V V _{CC} = 30 V f = 1.0 MHz	-	3610	5415	pF	
Output capacitance	C _{oes}		-	714	1071		
Reverse transfer capacitance	C _{res}		-	58	87		
Diode reverse recovery time	t _{rr}	V _R = 200 V; I _C = 25 A; dI/dt = 200 A/μs	-	50	-	ns	
Diode peak reverse current	I _{rr}		-	4.5	-	A	
Diode Recovery charge	Q _{rr}		-	112	-	nC	
Diode peak rate of fall of recovery during t _b	dI _(rec) /dt		-	250	-	A/μs	

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	T_J		-40	-	150	°C
Storage temperature range	T_{Stg}		-40	-	125	
Junction to case	IGBT	R_{thJC}	-	-	0.64	°C/W
	Diode		-	-	0.9	
Case to sink per module	R_{thCS}	Heatsink compound thermal conductivity = 1 W/mK	-	0.06	-	
Clearance ⁽¹⁾		External shortest distance in air between 2 terminals	5.5	-	-	mm
Creepage ⁽¹⁾		Shortest distance along external surface of the insulating material between 2 terminals	8	-	-	
Weight			66			g

Note

⁽¹⁾ Standard version only i.e. without optional thermistor

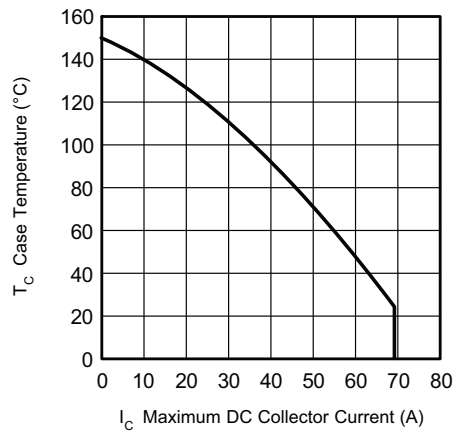


Fig. 1 - Maximum Collector Current vs. Case Temperature

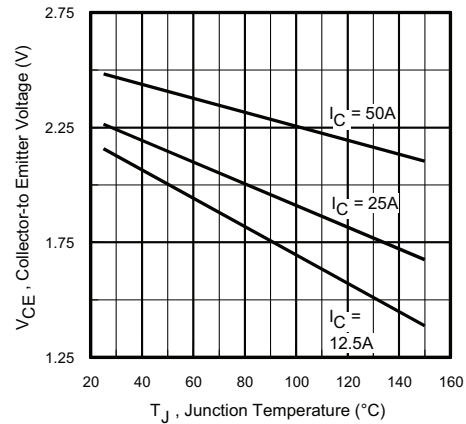


Fig. 2 - Typical Collector to Emitter Voltage vs. Junction Temperature

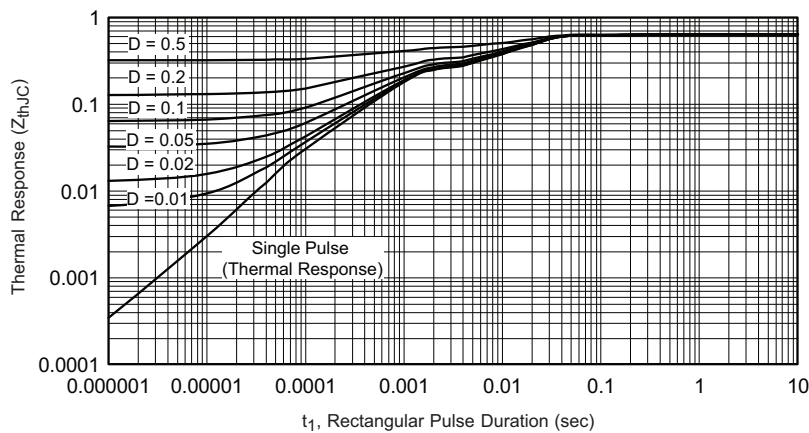


Fig. 3 - Maximum Transient Thermal Impedance, Junction to Case (IGBT)

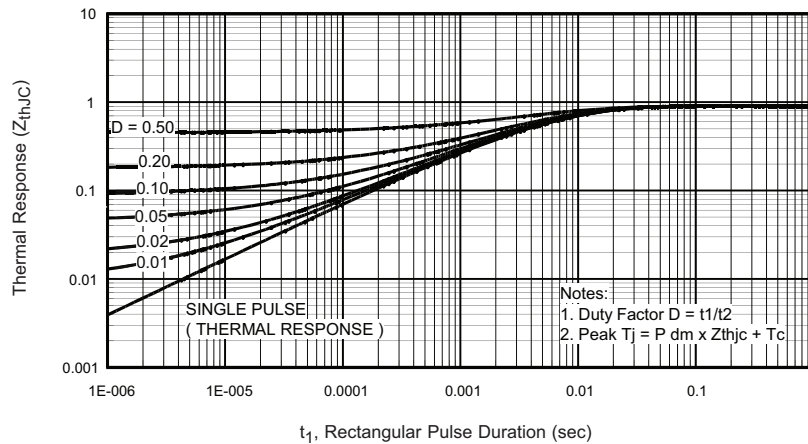


Fig. 4 - Maximum Transient Thermal Impedance, Junction to Case (Diode)

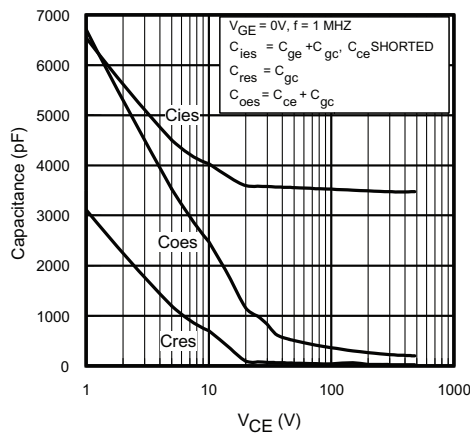


Fig. 5 - Typical Capacitance vs. Collector to Emitter Voltage

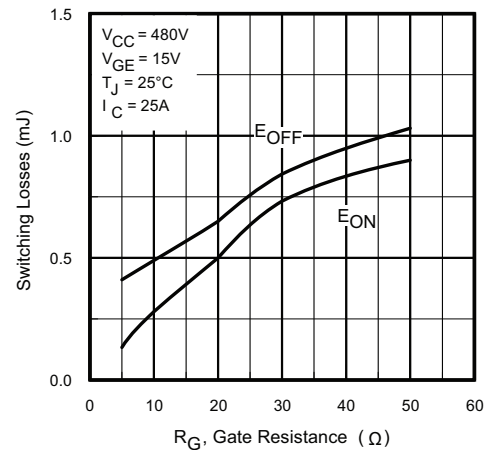


Fig. 7 - Typical Switching Losses vs. Gate Resistance

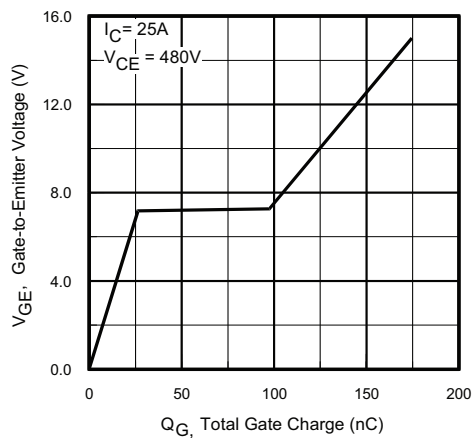


Fig. 6 - Typical Gate Charge vs. Gate to Emitter Voltage

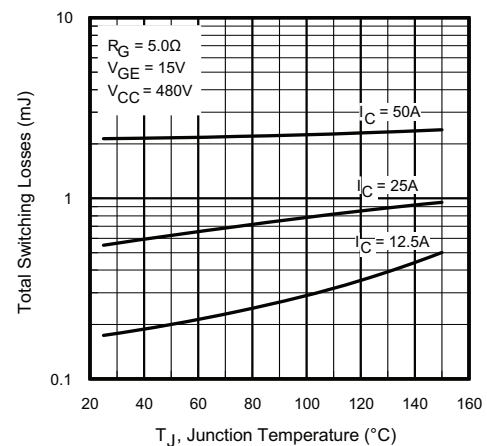


Fig. 8 - Typical Switching Losses vs. Junction Temperature

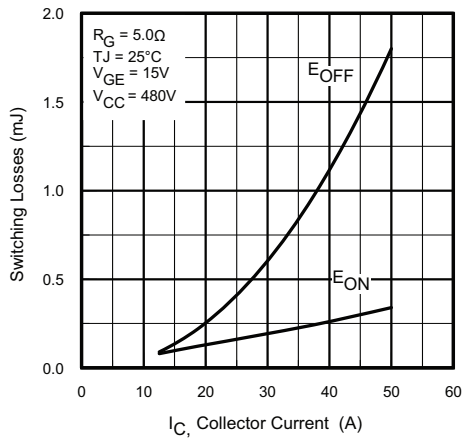


Fig. 9 - Typical Switching Losses vs. Collector to Emitter Current

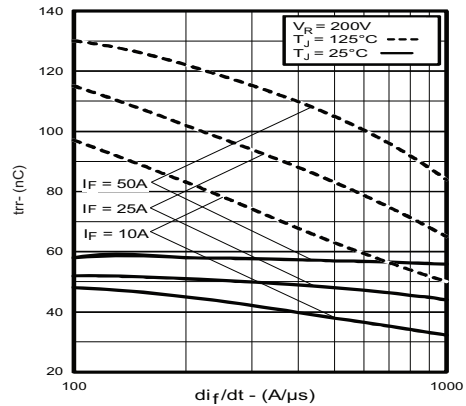


Fig. 12 - Typical Reverse Recovery Time vs. di_f/dt

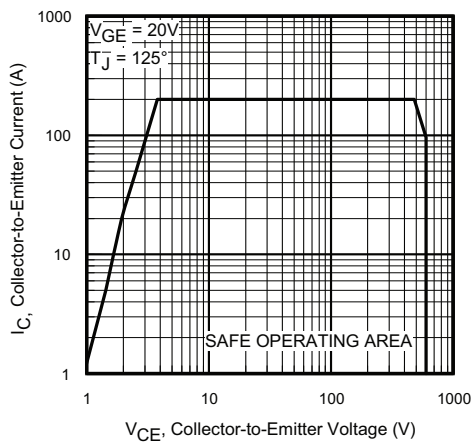


Fig. 10 - Turn-Off SOA

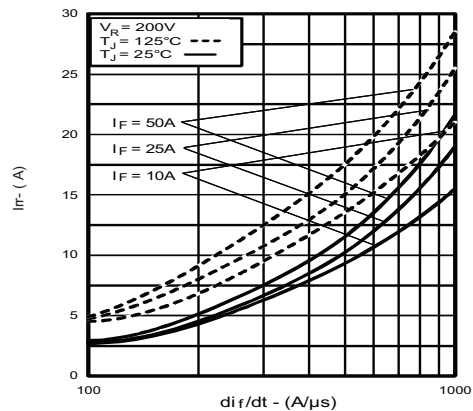


Fig. 13 - Typical Reverse Recovery Current vs. di_f/dt

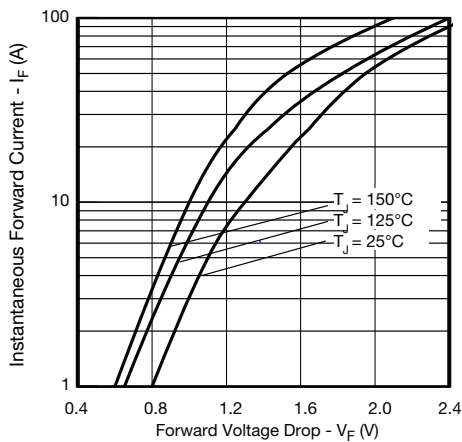


Fig. 11 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

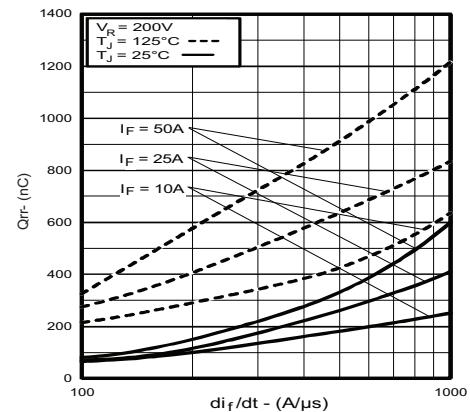


Fig. 14 - Typical Stored Charge vs. di_f/dt

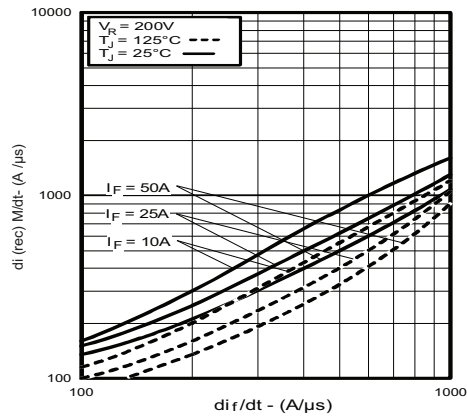


Fig. 15 - Typical $di_{(rec)M}/dt$ vs. di_F/dt

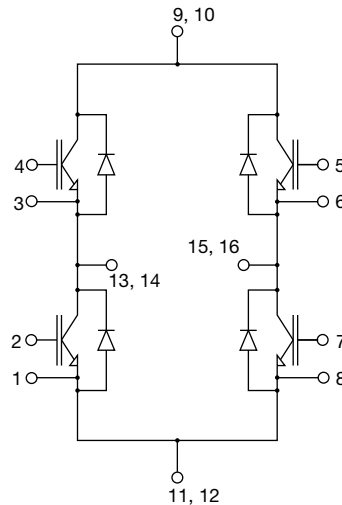


Fig. 16 - Electrical diagram

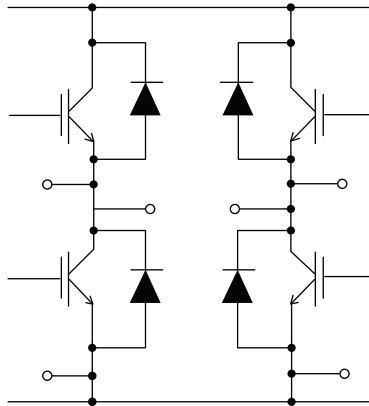
ORDERING INFORMATION TABLE

Device code	VS-	25	MT	060	W	F	A	PbF
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Vishay Semiconductors product
- 2** - Current rating (25 = 25 A)
- 3** - Essential part number
- 4** - Voltage code (060 = 600 V)
- 5** - Speed/type (W = Warp IGBT)
- 6** - Circuit configuration (F = Full bridge)
- 7** - A = Al₂O₃ DBC substrate
- 8** - PbF = Lead (Pb)-free



CIRCUIT CONFIGURATION



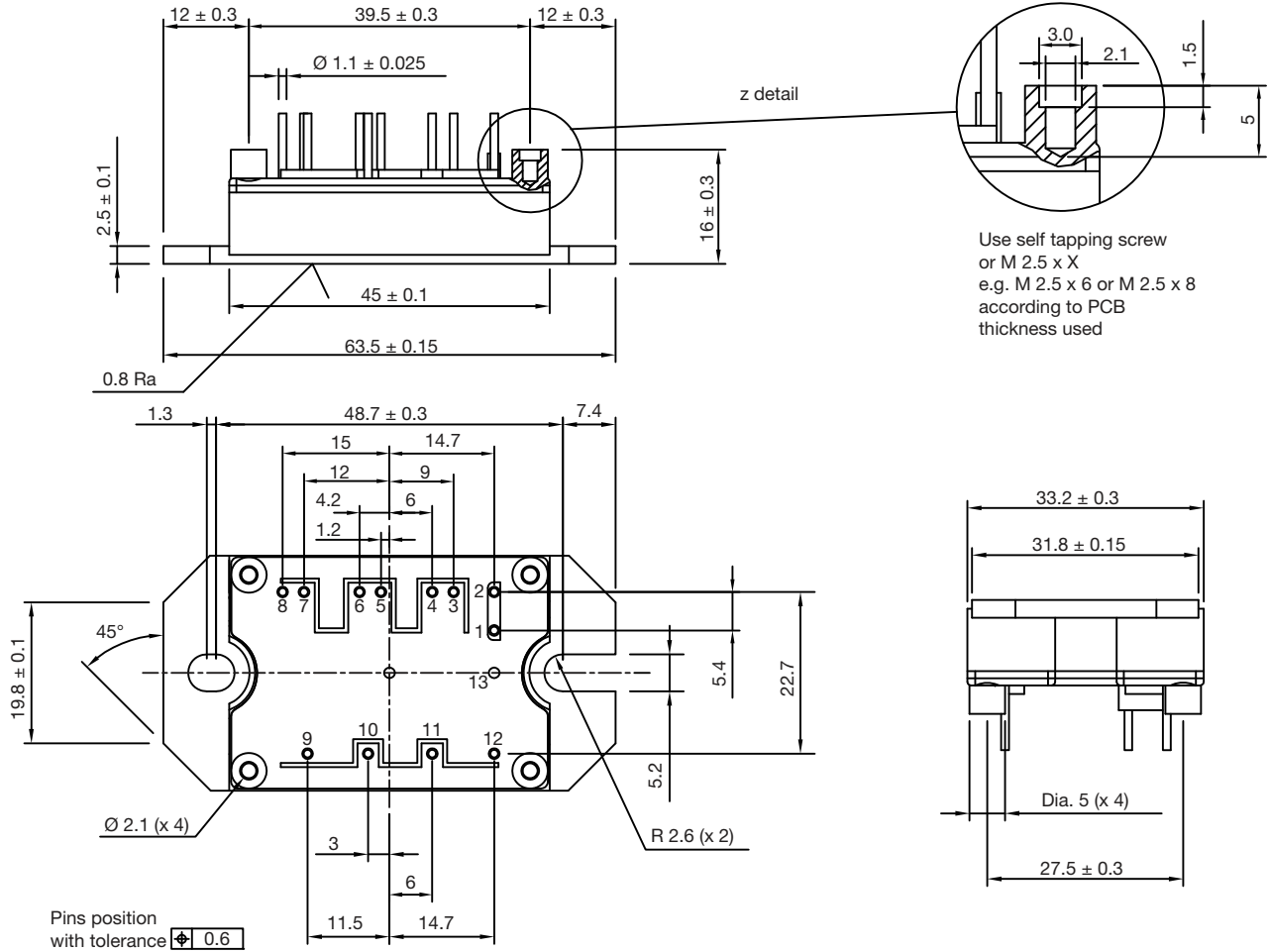
LINKS TO RELATED DOCUMENTS

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95245



MTP

DIMENSIONS in millimeters



Use self tapping screw or M 2.5 x X e.g. M 2.5 x 6 or M 2.5 x 8 according to PCB thickness used

Note

- Unused terminals are not assembled in the package



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