MITSUBISHI <MOSFET MODULE>

FM200TU-2A

HIGH POWER SWITCHING USE
INSULATED PACKAGE

FM200TU-2A

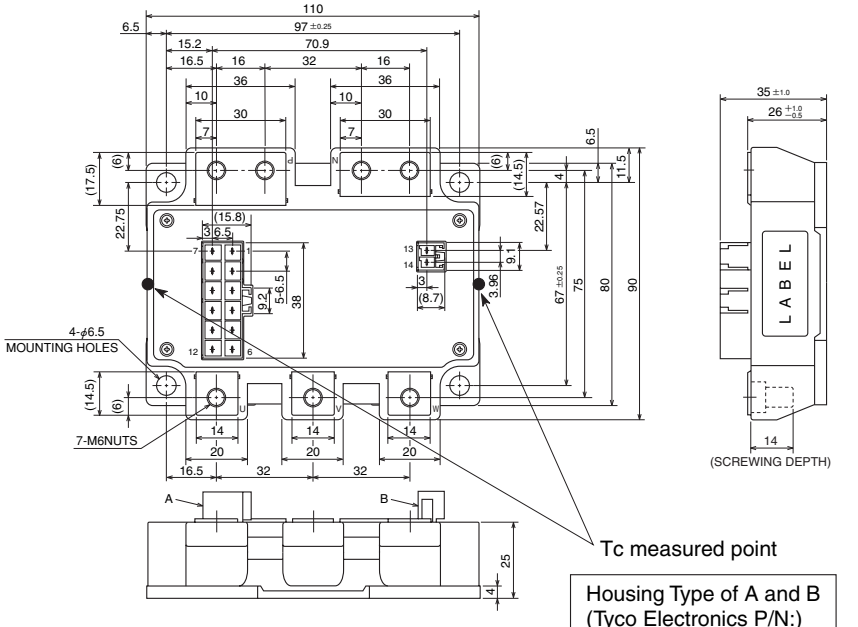
- $I_{D(rms)}$ 100A
- V_{DSS} 100V
- Insulated Type
- 6-elements in a pack
- NTC Thermistor inside
- UL Recognized
  Yellow Card No.E80276
  File No.E80271

APPLICATION

AC motor control of forklift (battery power source), UPS

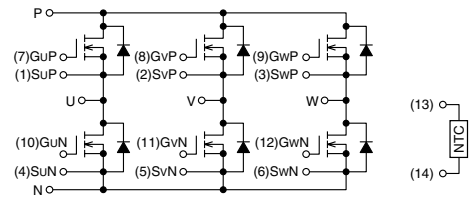
OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Housing Type of A and B
(Tyco Electronics P/N:)
A: 917353-1
B: 179838-1

CIRCUIT DIAGRAM



(1)SuP	(2)SvP	(3)SwP	(4)SuN	(5)SvN	(6)SwN	A
(7)GuP	(8)GvP	(9)GwP	(10)GuN	(11)GvN	(12)GwN	
(13)TH1	(14)TH2					B

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MITSUBISHI ELECTRIC

FM200TU-2A

HIGH POWER SWITCHING USE
INSULATED PACKAGE

ABSOLUTE MAXIMUM RATINGS (Tch = 25°C unless otherwise specified.)

Symbol	Item	Conditions	Ratings	Unit
V_{DSS}	Drain-source voltage	G-S Short	100	V
V_{GSS}	Gate-source voltage	D-S Short	±20	V
$I_{D(rms)}$	Drain current	Tc' = 137°C*3	100	Arms
I_{DM}		Pulse*2	200	A
I_{DA}	Avalanche current	L = 10μH Pulse*2	100	A
$I_{S(rms)}$*1	Source current		100	Arms
I_{SM}*1		Pulse*2	200	A
P_D*4	Maximum power dissipation	Tc = 25°C	410	W
P_D*4		Tc' = 25°C*3	560	W
T_{ch}	Channel temperature		–40 ~ +150	°C
T_{stg}	Storage temperature		–40 ~ +125	°C
V_{iso}	Isolation voltage	Terminals to base plate, f = 60Hz, AC 1 minute	2500	Vrms
—	Mounting torque	Main terminals M6 screw	3.5 ~ 4.5	N • m
		Mounting M6 screw	3.5 ~ 4.5	N • m
—	Weight	Typical value	600	g

ELECTRICAL CHARACTERISTICS (Tch = 25°C unless otherwise specified.)

Symbol	Item	Conditions		Limits			Unit
				Min.	Typ.	Max.	
I_{DSS}	Drain cutoff current	V_{DS} = V_{DSS}, V_{GS} = 0V		—	—	1	mA
$V_{GS(th)}$	Gate-source threshold voltage	I_D = 10mA, V_{DS} = 10V		4.7	6	7.3	V
I_{GSS}	Gate leakage current	V_{GS} = V_{GSS}, V_{DS} = 0V		—	—	1.5	μA
$r_{DS(ON)}$ (chip)	Static drain-source On-state resistance	I_D = 100A, V_{GS} = 15V	Tch = 25°C	—	2.4	3.3	mΩ
			Tch = 125°C	—	4.1	—	
$V_{DS(ON)}$ (chip)	Static drain-source On-state voltage	I_D = 100A, V_{GS} = 15V	Tch = 25°C	—	0.24	0.33	V
			Tch = 125°C	—	0.41	—	
$R_{(lead)}$	Lead resistance	I_D = 100A terminal-chip	Tch = 25°C	—	1.2	—	mΩ
			Tch = 125°C	—	1.68	—	
C_{iss}	Input capacitance	V_{DS} = 10V, V_{GS} = 0V		—	—	50	nF
C_{oss}	Output capacitance			—	—	7	
C_{rss}	Reverse transfer capacitance			—	—	4	
Q_G	Total gate charge	V_{DD} = 48V, I_D = 100A, V_{GS} = 15V		—	760	—	nC
$t_{d(on)}$	Turn-on delay time	V_{DD} = 48V, I_D = 100A, V_{GS} ± 15V, R_G = 13Ω, Inductive load, I_S = 100A		—	—	400	ns
t_r	Turn-on rise time			—	—	300	
$t_{d(off)}$	Turn-off delay time			—	—	450	
t_f	Turn-off fall time			—	—	300	
t_{rr}*1	Reverse recovery time			—	—	250	ns
Q_{rr}*1	Reverse recovery charge			—	3.6	—	μC
V_{SD}*1	Source-drain voltage	I_S = 100A, V_{GS} = 0V		—	—	1.3	V
$R_{th(ch-c)}$	Thermal resistance	MOSFET part (1/6 module)*7		—	—	0.30	K/W
$R_{th(ch-c')}$		MOSFET part (1/6 module)*3		—	—	0.22	
$R_{th(c-f)}$	Contact thermal resistance	Case to heat sink, Thermal grease Applied*8 (1/6 module)		—	0.1	—	
$R_{th(c'-f')}$		Case to heat sink, Thermal grease Applied*3, *8 (1/6 module)		—	0.09	—	

NTC THERMISTOR PART

Symbol	Parameter	Conditions	Limits			Unit
			Min.	Typ.	Max.	
R_{Th}*6	Resistance	T_{Th} = 25°C*5	—	100	—	kΩ
B*6	B Constant	Resistance at T_{Th} = 25°C, 50°C*5	—	4000	—	K

*1: It is characteristics of the anti-parallel, source-drain free-wheel diode (FWDi).
*2: Pulse width and repetition rate should be such that the device channel temperature (T_{ch}) does not exceed T_{ch} max rating.
*3: Case Temperature (Tc') measured point is just under the chips. If use this value, $R_{th(f-a)}$ should be measured just under the chips.
*4: Pulse width and repetition rate should be such as to cause negligible temperature rise.
*5: T_{Th} is thermistor temperature.
*6: $B = \ln(\frac{R_{25}}{R_{50}})/(\frac{1}{T_{25}} - \frac{1}{T_{50}})$
R_{25}: resistance at absolute temperature T_{25} [K]: T_{25} = 25 [°C]+273.15 = 298.15 [K]
R_{50}: resistance at absolute temperature T_{50} [K]: T_{50} = 50 [°C]+273.15 = 323.15 [K]
*7: Case Temperature (Tc) measured point is shown in page OUTLINE DRAWING.
*8: Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].

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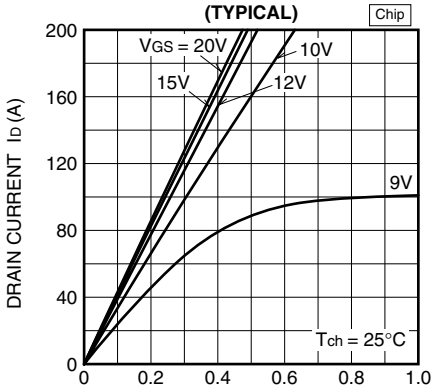
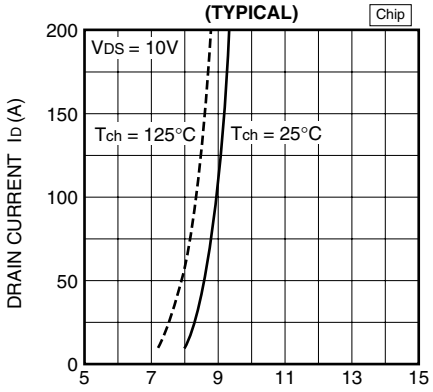
PERFORMANCE CURVES

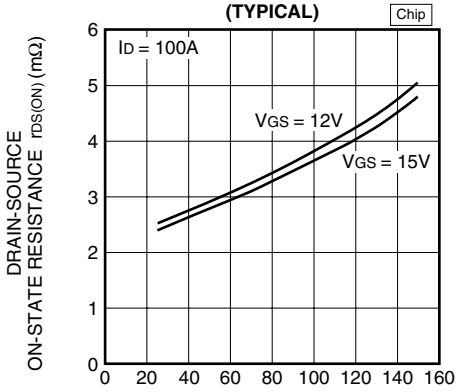
OUTPUT CHARACTERISTICS (TYPICAL) Chip



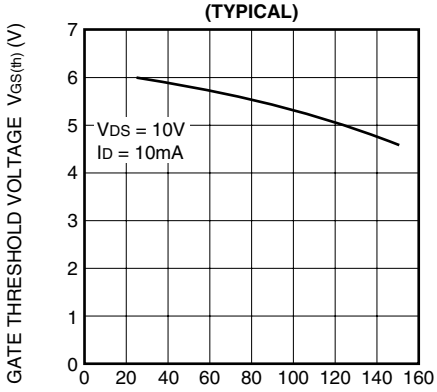
TRANSFER CHARACTERISTICS (TYPICAL) Chip



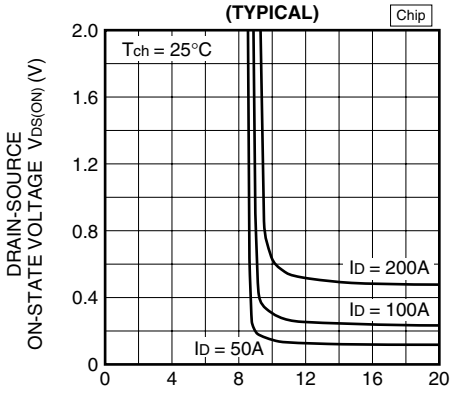
DRAIN-SOURCE ON-STATE VOLTAGE VS. TEMPERATURE (TYPICAL) Chip



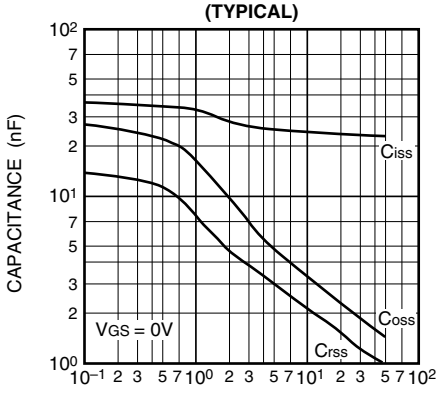
GATE THRESHOLD VOLTAGE VS. TEMPERATURE (TYPICAL)



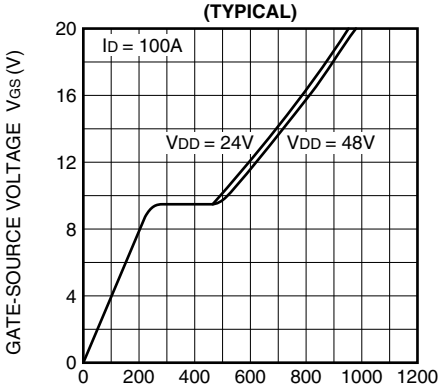
DRAIN-SOURCE ON-STATE VOLTAGE VS. GATE BIAS (TYPICAL) Chip



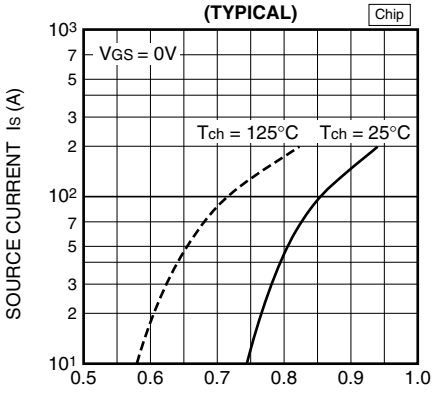
CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)



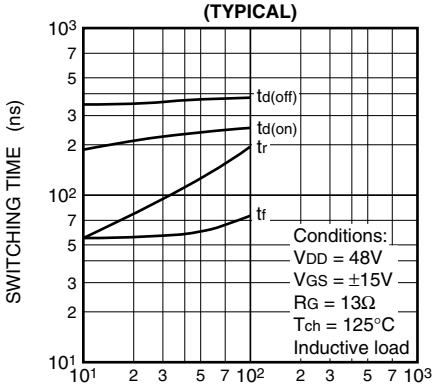
GATE CHARGE CHARACTERISTICS (TYPICAL)



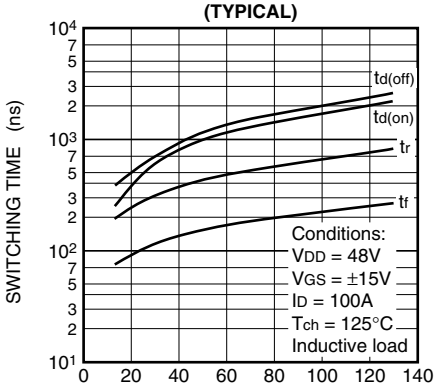
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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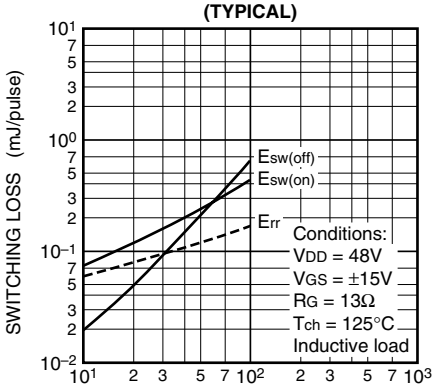
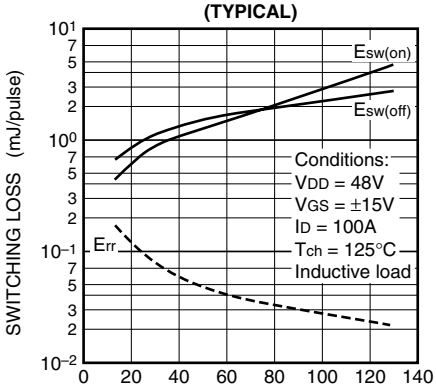
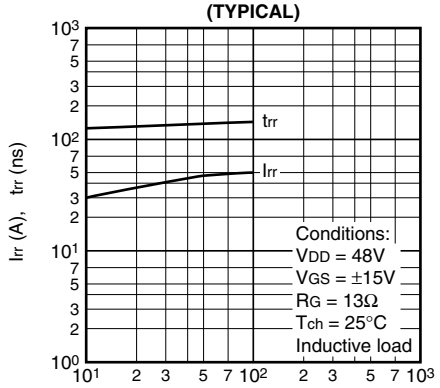


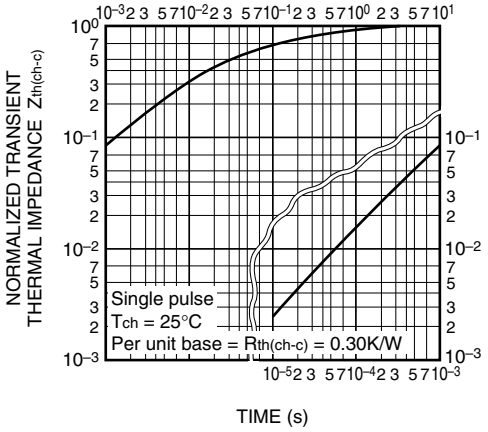
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS



CHIP LAYOUT