

FM600TU-2A

HIGH POWER SWITCHING USE
INSULATED PACKAGE

FM600TU-2A



- ID(rms)300A
- VDSS 100V
- Insulated Type
- 6-elements in a pack
- NTC Thermistor inside
- UL Recognized

Yellow Card No.E80276

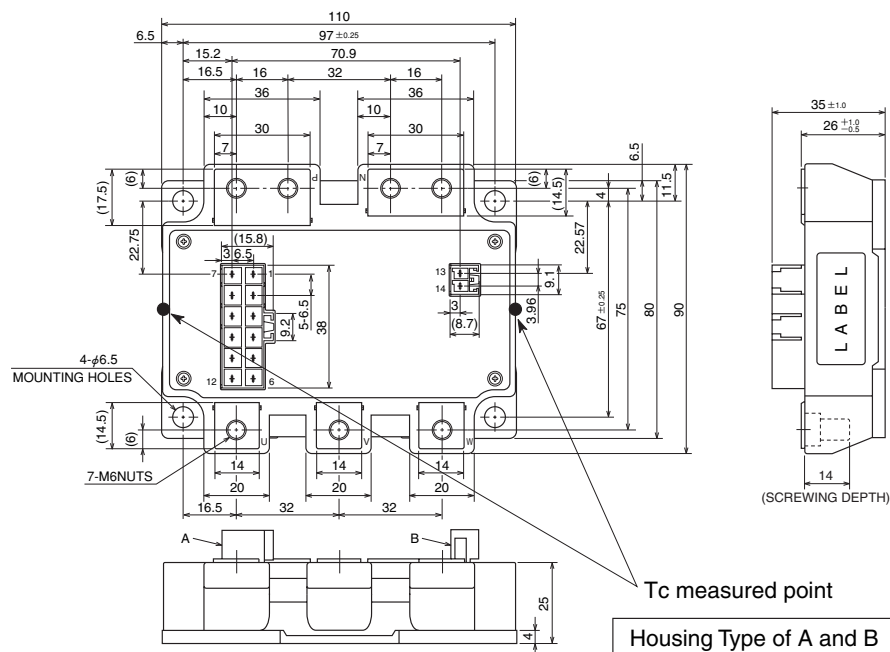
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APPLICATION

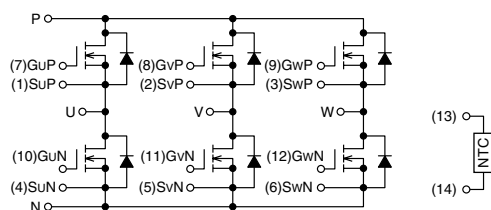
AC motor control of forklift (battery power source), UPS

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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	A
(13)TH1	(14)TH2					B

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ABSOLUTE MAXIMUM RATINGS (T_{ch} = 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	T _c ' = 133°C*3	300	A _{rms}
I _{DM}		Pulse*2	600	A
I _{DA}	Avalanche current	L = 10μH Pulse*2	300	A
I _{S(rms)} *1	Source current		300	A _{rms}
I _{SM} *1		Pulse*2	600	A
P _D *4	Maximum power dissipation	T _c = 25°C	960	W
P _D *4		T _c ' = 25°C*3	1300	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	V _{rms}
—	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 (T_{ch} = 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 = 30mA, 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)}	Static drain-source On-state resistance (chip)	I _D = 300A V _{GS} = 15V	T _{ch} = 25°C	0.8	1.1	mΩ
			T _{ch} = 125°C	1.37	—	
V _{DS(ON)}	Static drain-source On-state voltage (chip)	I _D = 300A V _{GS} = 15V	T _{ch} = 25°C	0.24	0.33	V
			T _{ch} = 125°C	0.41	—	
R _(lead)	Lead resistance	I _D = 300A terminal-chip	T _{ch} = 25°C	0.7	—	mΩ
			T _{ch} = 125°C	1.0	—	
C _{iss}	Input capacitance	V _{DS} = 10V V _{GS} = 0V	—	—	110	nF
C _{oss}	Output capacitance		—	—	15	
C _{rss}	Reverse transfer capacitance		—	—	10	
Q _G	Total gate charge	V _{DD} = 48V, I _D = 300A, V _{GS} = 15V	—	1800	—	nC
t _{d(on)}	Turn-on delay time	V _{DD} = 48V, I _D = 300A, V _{GS} ± 15V R _G = 4.2Ω, Inductive load I _S = 300A	—	—	400	ns
t _r	Turn-on rise time		—	—	600	
t _{d(off)}	Turn-off delay time		—	—	600	
t _f	Turn-off fall time		—	—	400	
t _{rr} *1	Reverse recovery time		—	—	250	ns
Q _{rr} *1	Reverse recovery charge		—	6.2	—	μC
V _{SD} *1	Source-drain voltage	I _S = 300A, V _{GS} = 0V	—	—	1.3	V
R _{th(ch-c)}	Thermal resistance	MOSFET part (1/6 module)*7	—	—	0.13	K/W
R _{th(ch-c')}		MOSFET part (1/6 module)*3	—	—	0.096	
R _{th(c-f)}	Contact thermal resistance	Case to fin, Thermal grease Applied*8 (1/6 module)	—	0.1	—	
R _{th(c'-f)}		Case to fin, 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 (T_c) 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: $B = \ln\left(\frac{R_{25}}{R_{50}}\right) / \left(\frac{1}{T_{25}} - \frac{1}{T_{50}}\right)$

R₂₅: resistance at absolute temperature T₂₅ [K]: T₂₅ = 25 [°C]+273.15 = 298.15 [K]

R₅₀: resistance at absolute temperature T₅₀ [K]: T₅₀ = 50 [°C]+273.15 = 323.15 [K]

*7: Case Temperature (T_c) measured point is shown in page OUTLINE DRAWING.

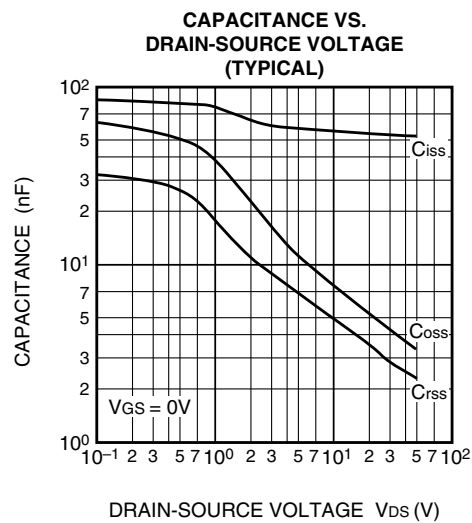
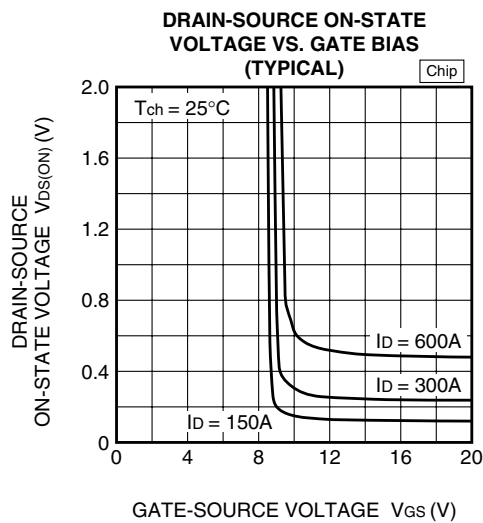
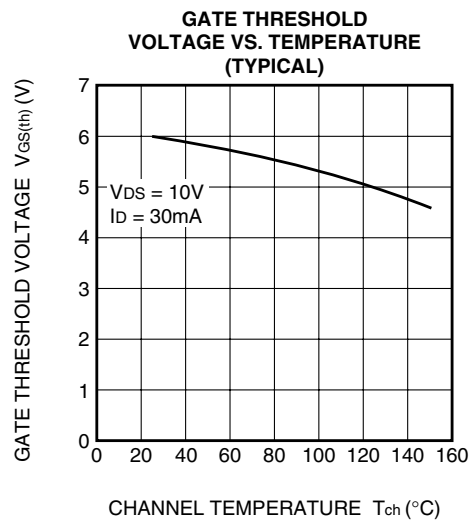
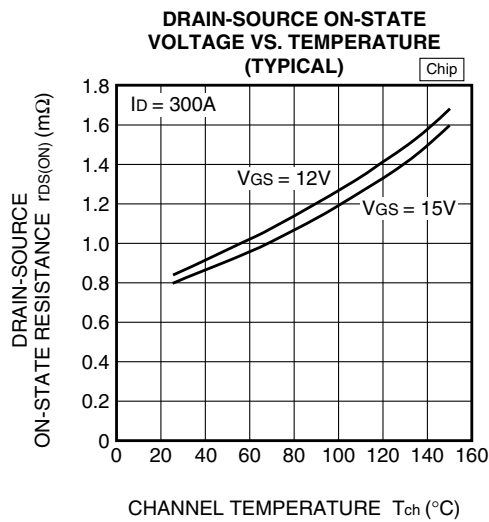
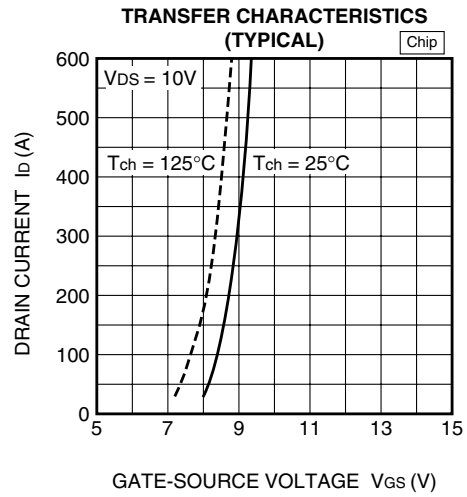
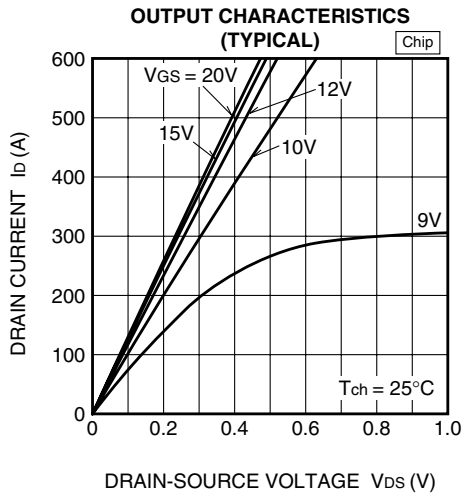
*8: Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].

Feb. 2009

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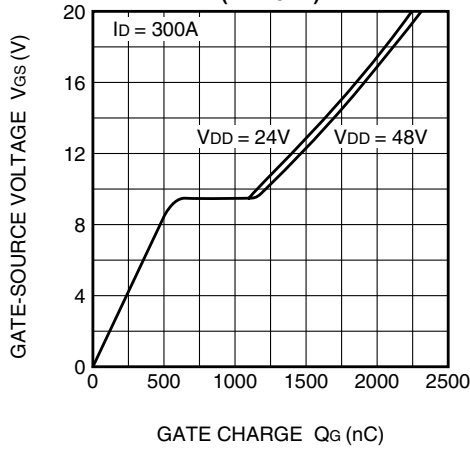
PERFORMANCE CURVES



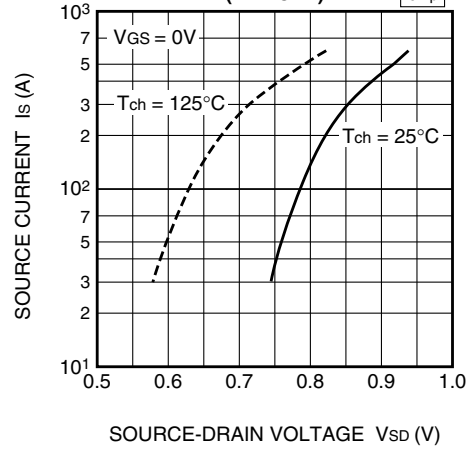
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HIGH POWER SWITCHING USE
INSULATED PACKAGE

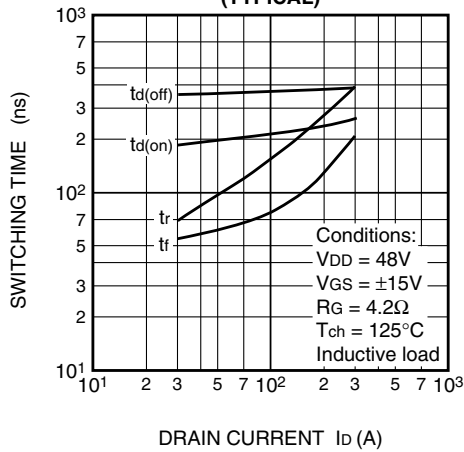
**GATE CHARGE CHARACTERISTICS
(TYPICAL)**



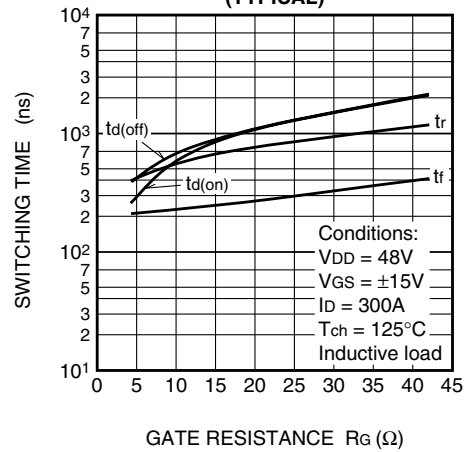
**FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)**



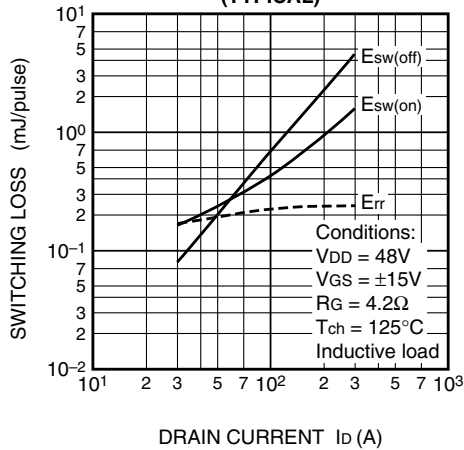
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



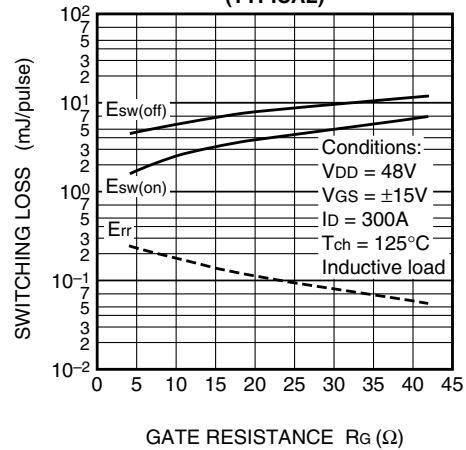
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



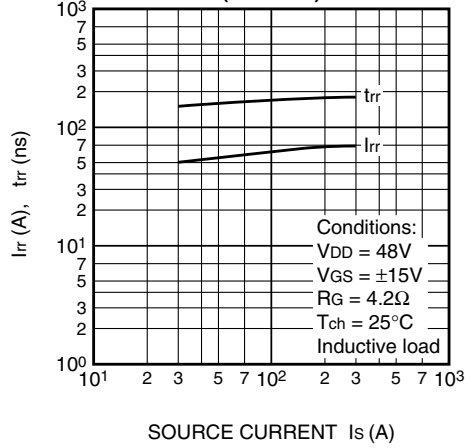
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



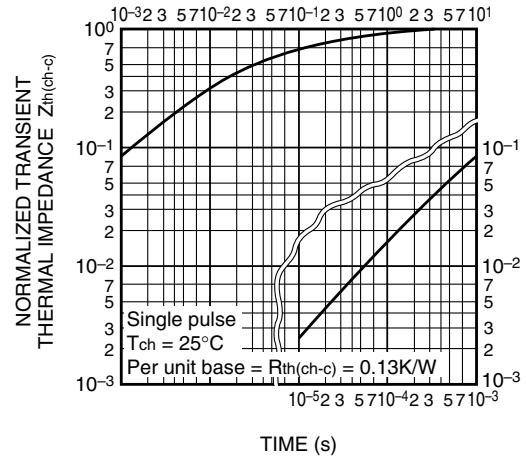
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REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS



CHIP LAYOUT

