FX6KMJ-2

HIGH-SPEED SWITCHING USE

FX6KMJ-2
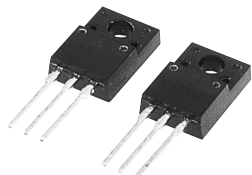
- 4V DRIVE
- V$_{DSS}$ .... −100V
- r$_{DS}$ (ON) (MAX) 0.58Ω
- I$_D$ .... −6A
- Integrated Fast Recovery Diode (TYP.) 80ns
- V$_{iso}$ 2000V

OUTLINE DRAWING — Dimensions in mm

① GATE
② DRAIN
③ SOURCE
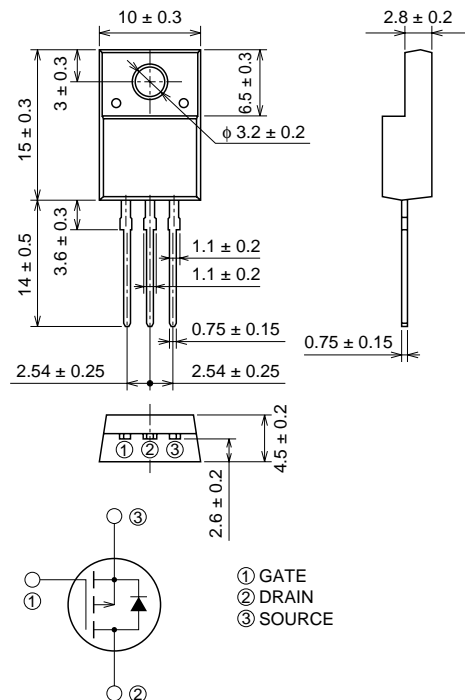
TO-220FN

APPLICATION

Motor control, Lamp control, Solenoid control
DC-DC converter, etc.

MAXIMUM RATINGS (Tc = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V$_{DSS}$	Drain-source voltage	V$_{GS}$ = 0V	−100	V
V$_{GSS}$	Gate-source voltage	V$_{DS}$ = 0V	±20	V
I$_D$	Drain current		−6	A
I$_{DM}$	Drain current (Pulsed)		−24	A
I$_{DA}$	Avalanche drain current (Pulsed)	L = 100μH	−6	A
I$_S$	Source current		−6	A
I$_{SM}$	Source current (Pulsed)		−24	A
P$_D$	Maximum power dissipation		20	W
T$_{ch}$	Channel temperature		−55 ~ +150	°C
T$_{stg}$	Storage temperature		−55 ~ +150	°C
V$_{iso}$	Isolation voltage	AC for 1minute, Terminal to case	2000	V
—	Weight	Typical value	2.0	g

MITSUBISHI ELECTRIC

PRELIMINARY
Notice: This is not a final specification.
Some parametric limits are subject to change.

ELECTRICAL CHARACTERISTICS (Tch = 25°C)

| Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V (BR) DSS	Drain-source breakdown voltage	ID = −1mA, VGS = 0V	−100	—	—	V
IGSS	Gate-source leakage current	VGS = ±20V, VDS = 0V	—	—	±0.1	µA
IDSS	Drain-source leakage current	VDS = −100V, VGS = 0V	—	—	−0.1	mA
VGS (th)	Gate-source threshold voltage	ID = −1mA, VDS = −10V	−1.0	−1.5	−2.0	V
rDS (ON)	Drain-source on-state resistance	ID = −3A, VGS = −10V	—	0.46	0.58	Ω
rDS (ON)	Drain-source on-state resistance	ID = −3A, VGS = −4V	—	0.55	0.72	Ω
VDS (ON)	Drain-source on-state voltage	ID = −3A, VGS = −10V	—	−1.38	−1.74	V
|yfs|	Forward transfer admittance	ID = −3A, VDS = −5V	—	4.7	—	S
Ciss	Input capacitance		—	1110	—	pF
Coss	Output capacitance	VDS = −10V, VGS = 0V, f = 1MHz	—	108	—	pF
Crss	Reverse transfer capacitance		—	44	—	pF
td (on)	Turn-on delay time		—	9	—	ns
tr	Rise time	VDD = −50V, ID = −3A, VGS = −10V, RGEN = RGS = 50Ω	—	8	—	ns
td (off)	Turn-off delay time		—	72	—	ns
tf	Fall time		—	33	—	ns
VSD	Source-drain voltage	IS = −3A, VGS = 0V	—	−1.0	−1.5	V
Rth (ch-c)	Thermal resistance	Channel to case	—	—	6.25	°C/W
trr	Reverse recovery time	IS = −6A, dis/dt = 100A/µs	—	80	—	ns

PERFORMANCE CURVES

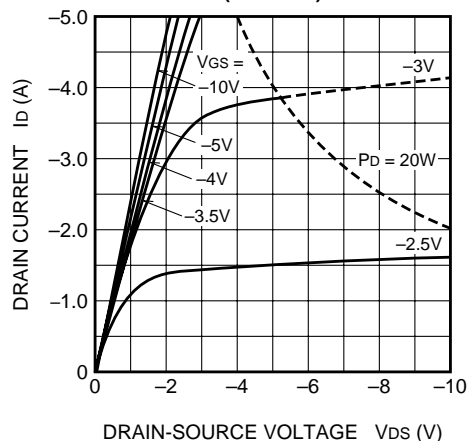### POWER DISSIPATION DERATING CURVE
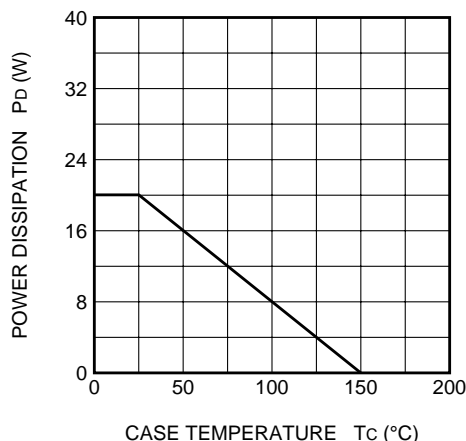
MAXIMUM SAFE OPERATING AREA
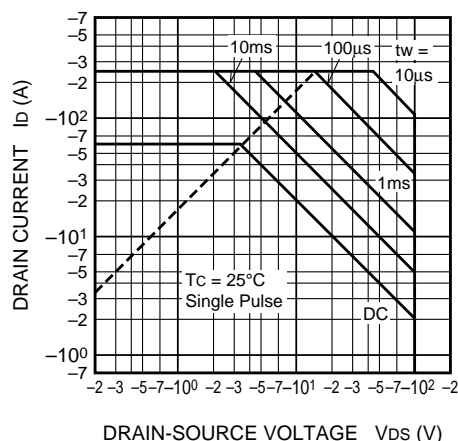
OUTPUT CHARACTERISTICS (TYPICAL)
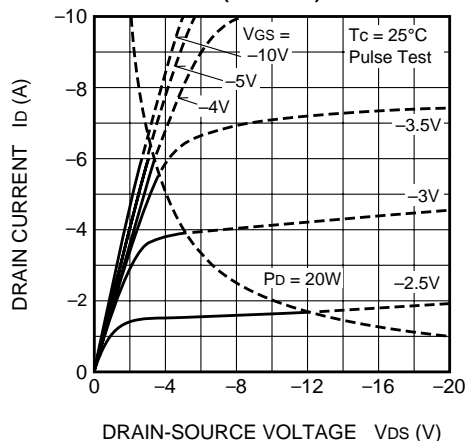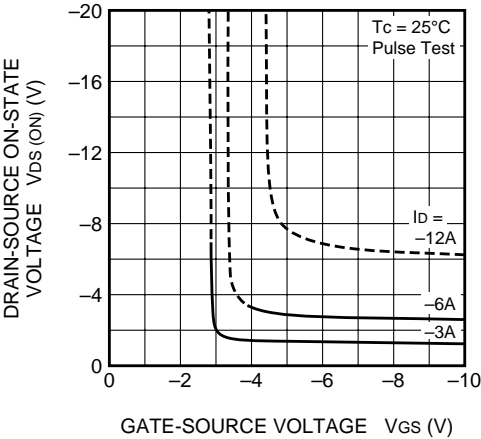

OUTPUT CHARACTERISTICS (TYPICAL)

Jan.1999

PRELIMINARY
Notice: This is not a final specification.
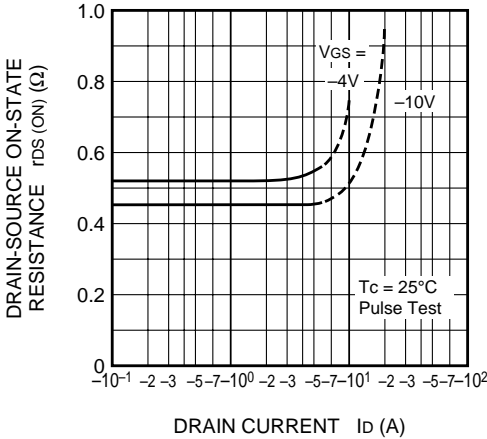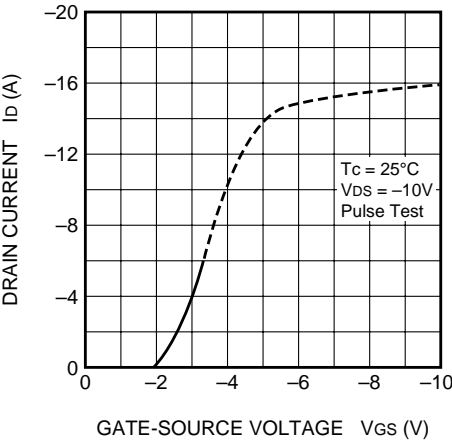Some parametric limits are subject to change.
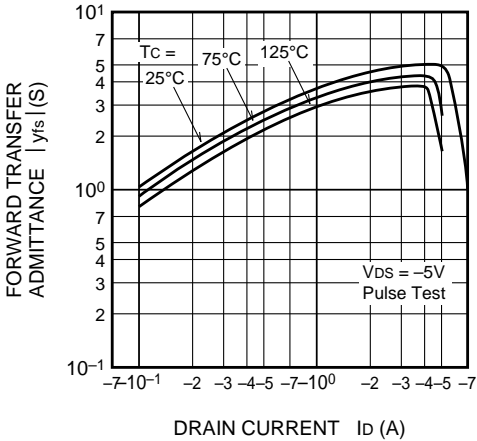
ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)

$T_C = 25°C$
Pulse Test
$I_D = -12A$
$-6A$
$-3A$

ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)

$V_{GS} = -4V$ $-10V$
$T_C = 25°C$
Pulse Test

TRANSFER CHARACTERISTICS (TYPICAL)

$T_C = 25°C$
$V_{DS} = -10V$
Pulse Test

FORWARD TRANSFER ADMITTANCE VS.DRAIN CURRENT (TYPICAL)

$T_C = 25°C$ $75°C$ $125°C$
$V_{DS} = -5V$
Pulse Test

CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)

Ciss
Coss
Crss
$T_{ch} = 25°C$
$f = 1MHz$
$V_{GS} = 0V$
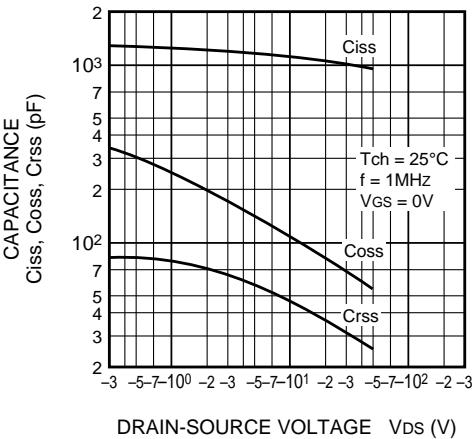
SWITCHING CHARACTERISTICS (TYPICAL)

$T_{ch} = 25°C$
$V_{GS} = -10V$
$V_{DD} = -50V$
$R_{GEN} = R_{GS} = 50\Omega$
td(off)
tf
td(on)
tr

Jan.1999

MITSUBISHI ELECTRIC
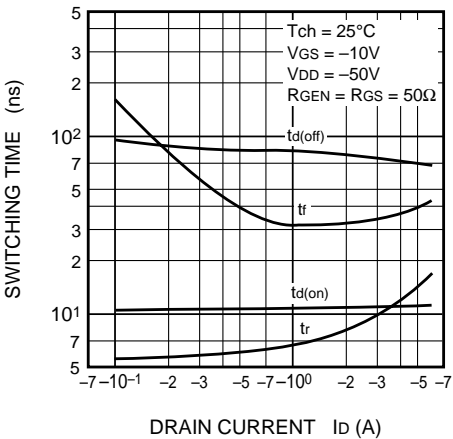
GATE-SOURCE VOLTAGE VS.GATE CHARGE (TYPICAL)

Tch = 25°C
ID = −6A

VDS =
−20V
−50V
−80V

GATE-SOURCE VOLTAGE VGS (V)

GATE CHARGE Qg (nC)
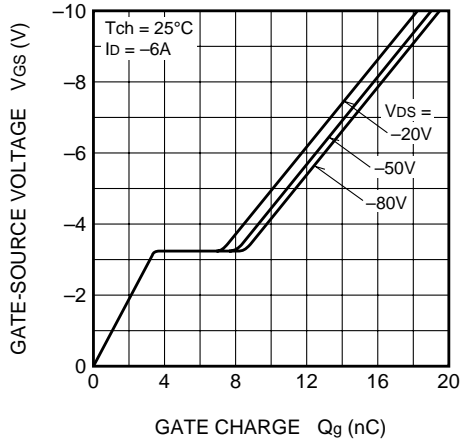
SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)

VGS = 0V
Pulse Test

TC =
25°C
75°C
125°C

SOURCE CURRENT Is (A)

SOURCE-DRAIN VOLTAGE VSD (V)
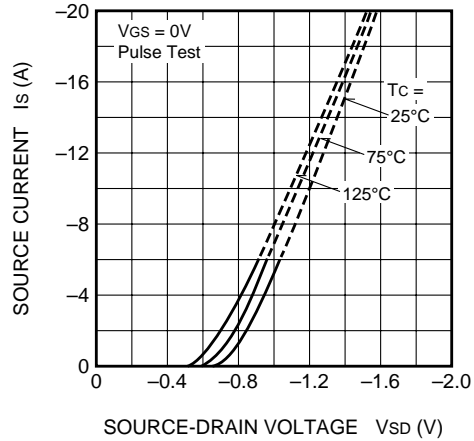
ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)

VGS = −10V
ID = 1/2ID
Pulse Test

DRAIN-SOURCE ON-STATE RESISTANCE $r_{DS (ON)}$ ($t°C$) / DRAIN-SOURCE ON-STATE RESISTANCE $r_{DS (ON)}$ (25°C)

CHANNEL TEMPERATURE Tch (°C)
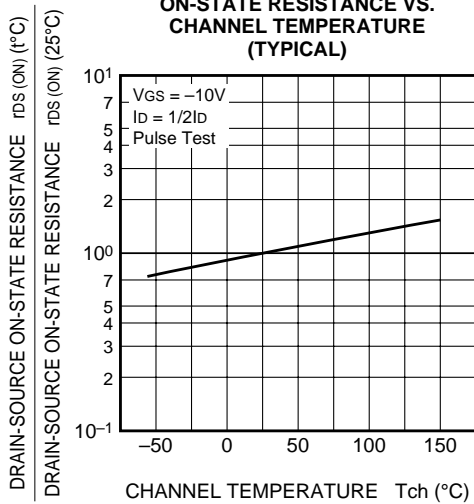
THRESHOLD VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)

VDS = −10V
ID = −1mA

GATE-SOURCE THRESHOLD VOLTAGE $V_{GS (th)}$ (V)

CHANNEL TEMPERATURE Tch (°C)
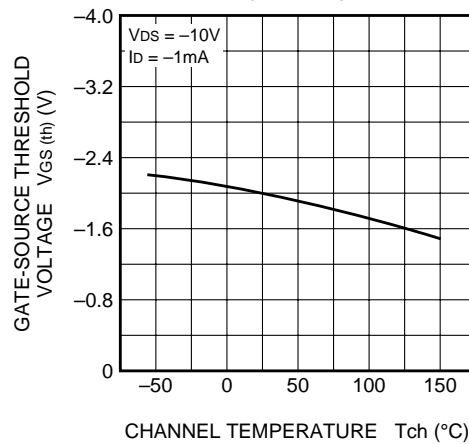
BREAKDOWN VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)

VGS = 0V
ID = −1mA

DRAIN-SOURCE BREAKDOWN VOLTAGE $V_{(BR) DSS}$ ($t°C$) / DRAIN-SOURCE BREAKDOWN VOLTAGE $V_{(BR) DSS}$ (25°C)

CHANNEL TEMPERATURE Tch (°C)
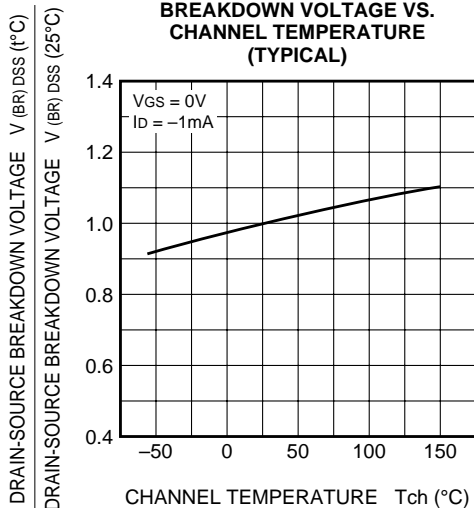
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS

D = 1.0
0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse

$D = \dfrac{t_w}{T}$

TRANSIENT THERMAL IMPEDANCE $Z_{th (ch-c)}$ (°C/W)

PULSE WIDTH t_w (s)

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