FS10VSJ-06

- 4V DRIVE
- V_{DSS} ·· 60V
- r_{DS} (ON) (MAX) ······························· 70mΩ
- I_D ·· 10A
- Integrated Fast Recovery Diode (TYP.) ······ 55ns

OUTLINE DRAWING — Dimensions in mm

① GATE
② DRAIN
③ SOURCE
④ DRAIN
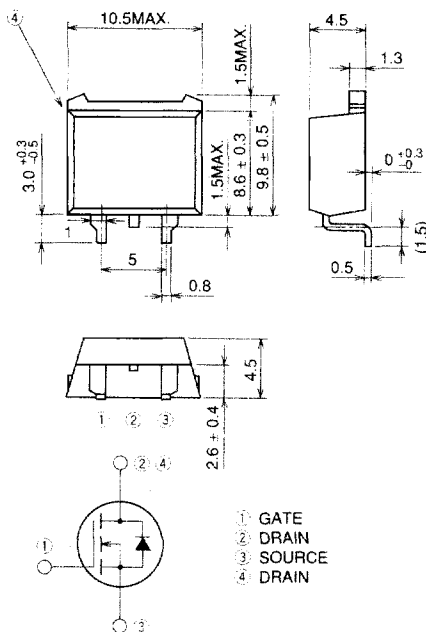
TO-220S

APPLICATION

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

MAXIMUM RATINGS (T_C = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V_{DSS}	Drain-source voltage	V_{GS} = 0V	60	V
V_{GSS}	Gate-source voltage	V_{DS} = 0V	±20	V
I_D	Drain current		10	A
I_{DM}	Drain current (Pulsed)		40	A
I_{DA}	Avalanche drain current (Pulsed)	L = 100μH	10	A
I_S	Source current		10	A
I_{SM}	Source current (Pulsed)		40	A
P_D	Maximum power dissipation		30	W
T_{ch}	Channel temperature		−55 ~ +150	°C
T_{stg}	Storage temperature		−55 ~ +150	°C
—	Weight	Typical value	1.2	g

HIGH-SPEED SWITCHING USE

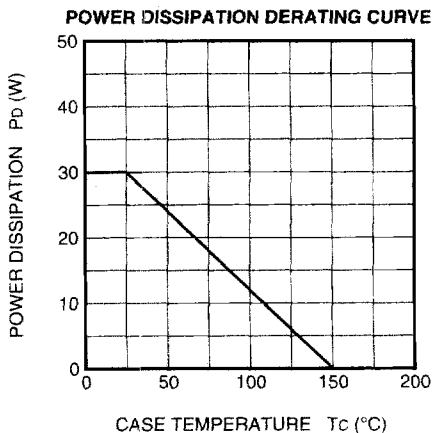## ELECTRICAL CHARACTERISTICS (Tch = 25°C)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V (BR) DSS	Drain-source breakdown voltage	ID = 1mA, VDS = 0V	60	—	—	V
IGSS	Gate leakage current	VGS = ±20V, VDS = 0V	—	—	±0.1	μA
IDSS	Drain current	VDS = 60V, 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 = 5A, VGS = 10V	—	53	70	mΩ
rDS (ON)	Drain-source on-state resistance	ID = 5A, VGS = 4V	—	66	91	mΩ
VDS (ON)	Drain-source on-state voltage	ID = 5A, VGS = 10V	—	0.265	0.35	V
yfs	Forward transfer admittance	ID = 5A, VDS = 5V	—	13	—	S
Ciss	Input capacitance		—	800	—	pF
Coss	Output capacitance	VDS = 10V, VGS = 0V, f = 1MHz	—	190	—	pF
Crss	Reverse transfer capacitance		—	80	—	pF
td (on)	Turn-on delay time		—	14	—	ns
tr	Rise time	VDD = 30V, ID = 5A, VGS = 10V, RGEN = RGS = 50Ω	—	17	—	ns
td (off)	Turn-off delay time		—	65	—	ns
tf	Fall time		—	40	—	ns
VSD	Source-drain voltage	IS = 5A, VGS = 0V	—	1.0	1.5	V
Rth (ch-c)	Thermal resistance	Channel to case	—	—	4.17	°C/W
trr	Reverse recovery time	IS = 10A, dis/dt ≈ −100A/μs	—	55	—	ns

PERFORMANCE CURVES

POWER DISSIPATION DERATING CURVE

MAXIMUM SAFE OPERATING AREA

OUTPUT CHARACTERISTICS (TYPICAL)

OUTPUT CHARACTERISTICS (TYPICAL)
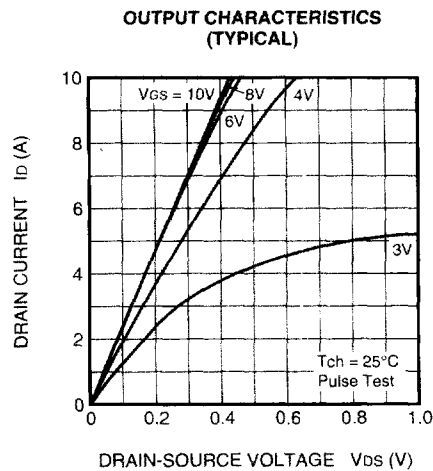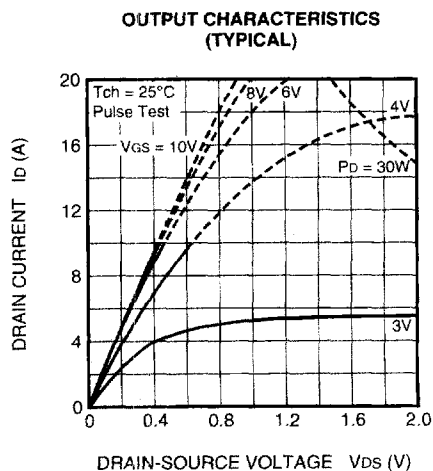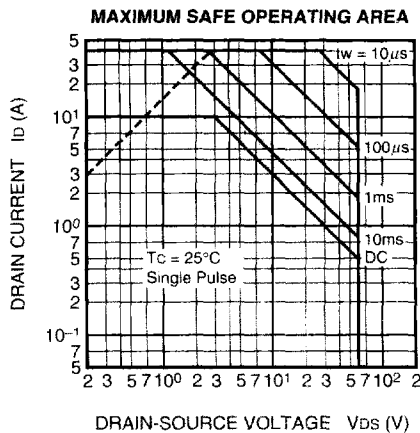
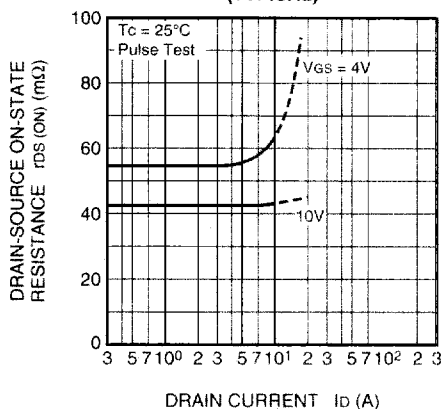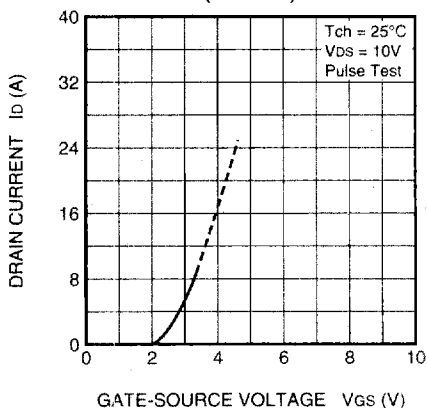### ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)
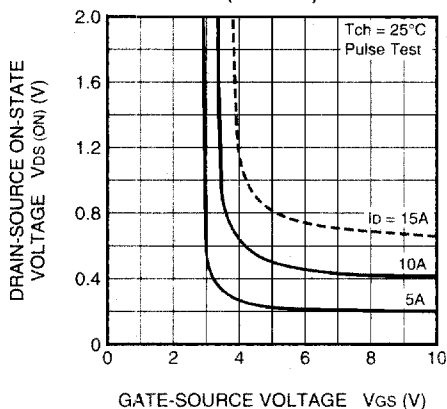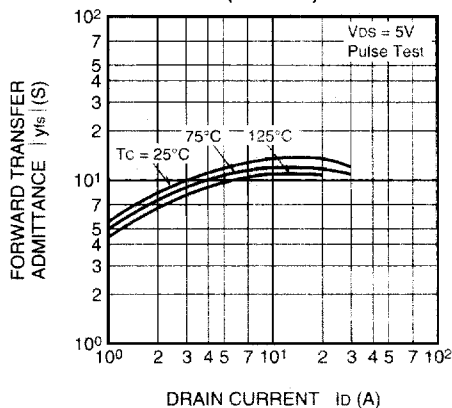

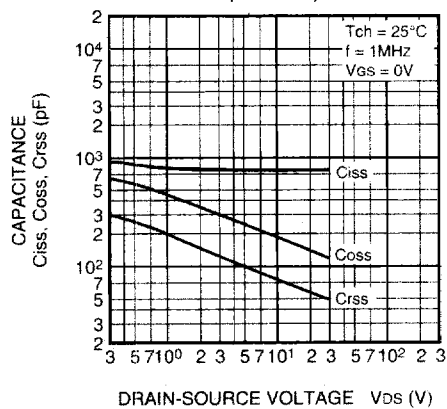### ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)

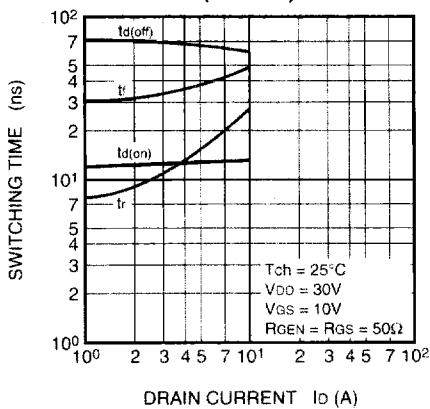

TRANSFER CHARACTERISTICS (TYPICAL)

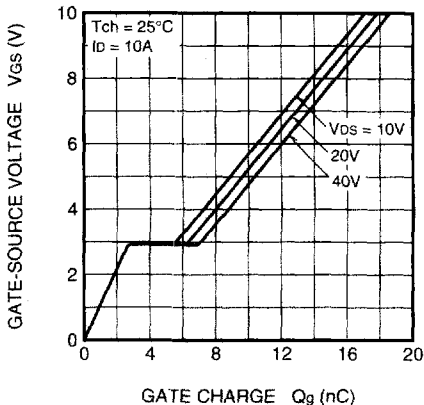### FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)

CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)
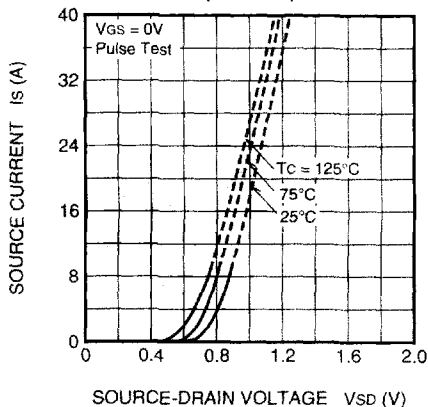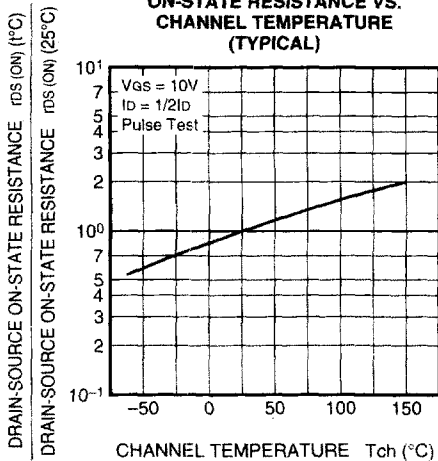

SWITCHING CHARACTERISTICS (TYPICAL)

MITSUBISHI ELECTRIC

GATE-SOURCE VOLTAGE VS.GATE CHARGE (TYPICAL)

Tch = 25°C
ID = 10A

VDS = 10V
20V
40V

GATE-SOURCE VOLTAGE VGS (V)

GATE CHARGE Qg (nC)

SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)

VGS = 0V
Pulse Test

TC = 125°C
75°C
25°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 rDS (ON) (t°C)
DRAIN-SOURCE ON-STATE RESISTANCE rDS (ON) (25°C)

CHANNEL TEMPERATURE Tch (°C)

THRESHOLD VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)

VDS = 10V
ID = 1mA

GATE-SOURCE THRESHOLD VOLTAGE VGS (th) (V)

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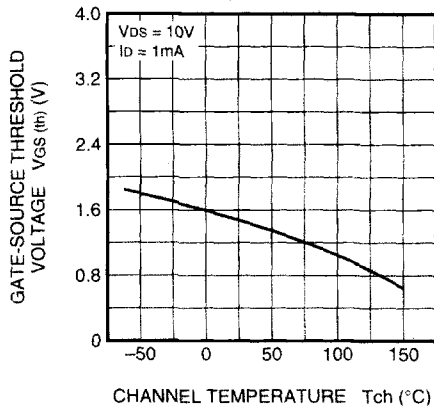
BREAKDOWN VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)

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)
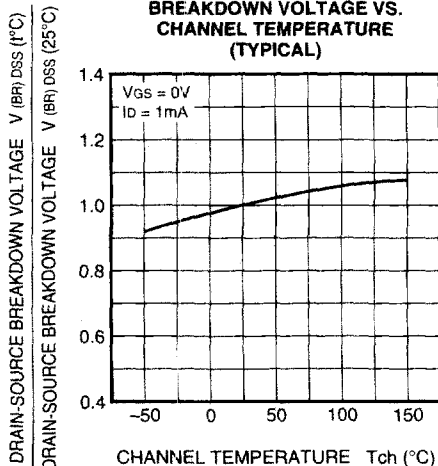
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS

D = 1.0
0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse

PDM

$D = \frac{tw}{T}$

TRANSIENT THERMAL IMPEDANCE Zth (ch–c) (°C/W)

PULSE WIDTH tw (s)

MITSUBISHI ELECTRIC