

## FUJI POWER MOSFET Super FAP-G Series

### N-CHANNEL SILICON POWER MOSFET

#### Features

- High speed switching
- Low on-resistance
- No secondary breakdown
- Low driving power
- Avalanche-proof

#### Applications

- Switching regulators
- UPS (Uninterruptible Power Supply)
- DC-DC converters

#### Maximum ratings and characteristic Absolute maximum ratings

( $T_c=25^\circ\text{C}$  unless otherwise specified)

Item	Symbol	Ratings	Unit
Drain-source voltage	$V_{DS}$	200	V
	$V_{DSX}^*5$	170	V
Continuous drain current	$I_D$	$\pm 45$	A
Pulsed drain current	$I_{D(puls)}$	$\pm 180$	A
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Non-repetitive Avalanche current	$I_{AS}^*2$	45	A
Maximum Avalanche Energy	$E_{AS}^*1$	258.9	mJ
Maximum Drain-Source dV/dt	$dV_{DS}/dt^*4$	20	kV/ $\mu\text{s}$
Peak Diode Recovery dV/dt	$dV/dt^*3$	5	kV/ $\mu\text{s}$
Max. power dissipation	$P_D$	$T_a=25^\circ\text{C}$	2.16
		$T_c=25^\circ\text{C}$	95
Operating and storage temperature range	$T_{ch}$	+150	$^\circ\text{C}$
	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Isolation voltage	$V_{ISO}^*6$	2	

\*1  $L=205\mu\text{H}$ ,  $V_{CC}=48\text{V}$ ,  $T_{ch}=25^\circ\text{C}$ , See to Avalanche Energy Graph \*2  $T_{ch} \leq 50^\circ\text{C}$

\*3  $I_F \leq -I_D$ ,  $-di/dt=50\text{A}/\mu\text{s}$ ,  $V_{CC} \leq BV_{DSS}$ ,  $T_{ch} \leq 150^\circ\text{C}$  \*4  $V_{DS} \leq 200\text{V}$  \*5  $V_{GS} = -30\text{V}$  \*6  $t=60\text{sec}$   $f=60\text{Hz}$

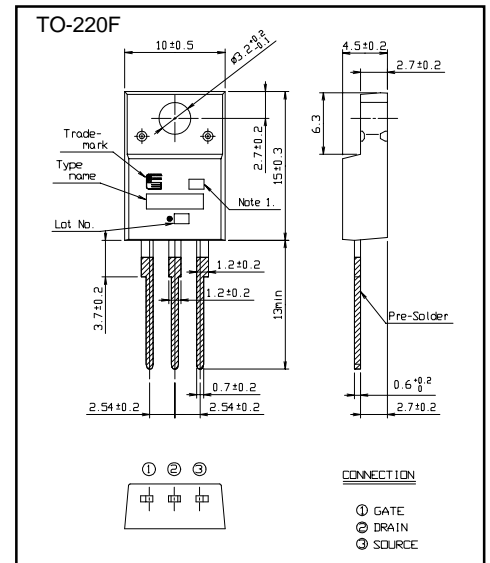
#### Electrical characteristics ( $T_c=25^\circ\text{C}$ unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$ $V_{GS}=0\text{V}$	200			V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$ $V_{DS}=V_{GS}$	3.0		5.0	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=200\text{V}$ $V_{GS}=0\text{V}$			25	$\mu\text{A}$
		$V_{DS}=160\text{V}$ $V_{GS}=0\text{V}$			250	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=\pm 30\text{V}$ $V_{DS}=0\text{V}$		10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=15\text{A}$ $V_{GS}=10\text{V}$		50	66	$\text{m}\Omega$
Forward transconductance	$g_{fs}$	$I_D=15\text{A}$ $V_{DS}=25\text{V}$	12.5	25		S
Input capacitance	$C_{iss}$	$V_{DS}=75\text{V}$		1960	2940	pF
Output capacitance	$C_{oss}$	$V_{GS}=0\text{V}$		260	390	
Reverse transfer capacitance	$C_{rss}$	$f=1\text{MHz}$		18	27	
Turn-on time $t_{on}$	$t_{d(on)}$	$V_{CC}=48\text{V}$ $I_D=15\text{A}$		20	30	ns
	$t_r$	$V_{GS}=10\text{V}$		17	26	
Turn-off time $t_{off}$	$t_{d(off)}$	$R_{GS}=10\Omega$		53	80	ns
	$t_f$			19	29	
Total Gate Charge	$Q_G$	$V_{CC}=100\text{V}$		51	76.5	nC
Gate-Source Charge	$Q_{GS}$	$I_D=30\text{A}$		15	22.5	
Gate-Drain Charge	$Q_{GD}$	$V_{GS}=10\text{V}$		16	24	
Avalanche capability	$I_{AV}$	$L=205\mu\text{H}$ $T_{ch}=25^\circ\text{C}$	45			A
Diode forward on-voltage	$V_{SD}$	$I_F=30\text{A}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$		1.10	1.65	V
Reverse recovery time	$t_{rr}$	$I_F=30\text{A}$ $V_{GS}=0\text{V}$		0.19		$\mu\text{s}$
Reverse recovery charge	$Q_{rr}$	$-di/dt=100\text{A}/\mu\text{s}$ $T_{ch}=25^\circ\text{C}$		1.4		$\mu\text{C}$

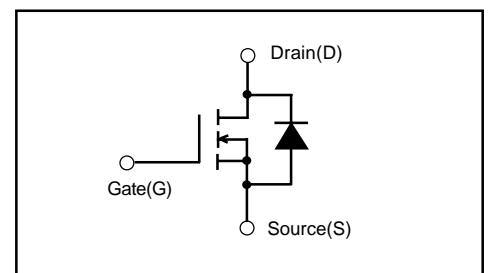
#### Thermal characteristics

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-c)}$	channel to case			1.316	$^\circ\text{C}/\text{W}$
	$R_{th(ch-a)}$	channel to ambient			58.0	$^\circ\text{C}/\text{W}$

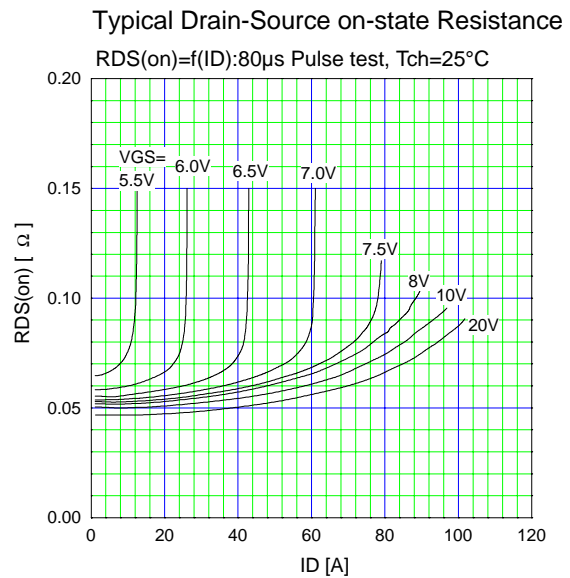
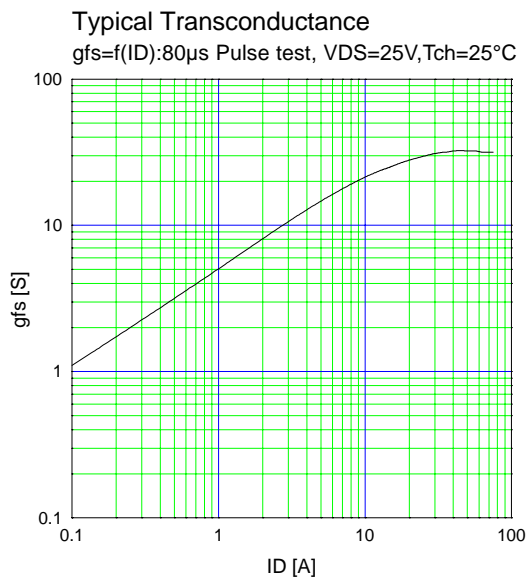
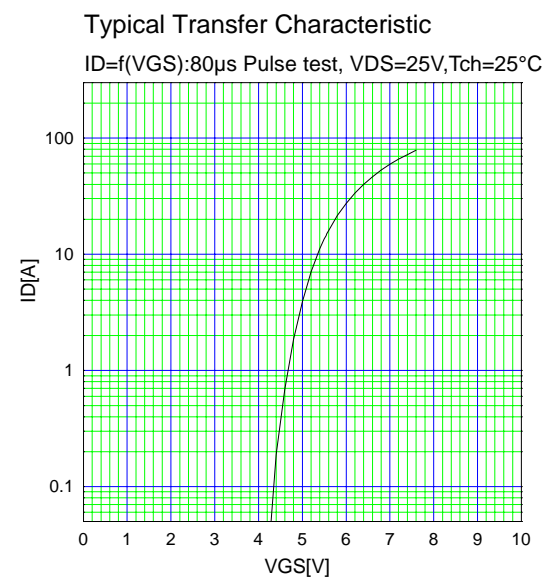
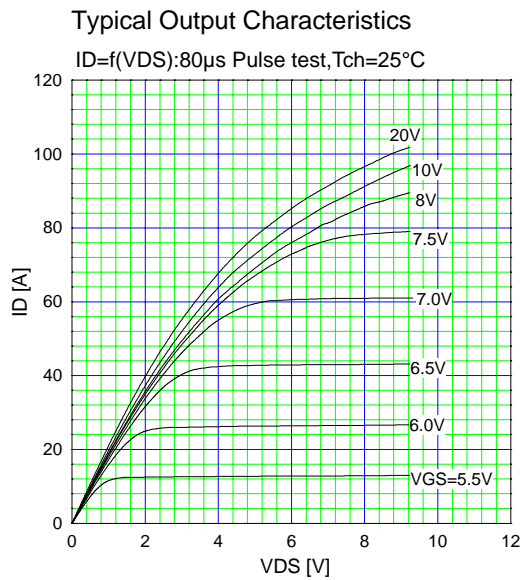
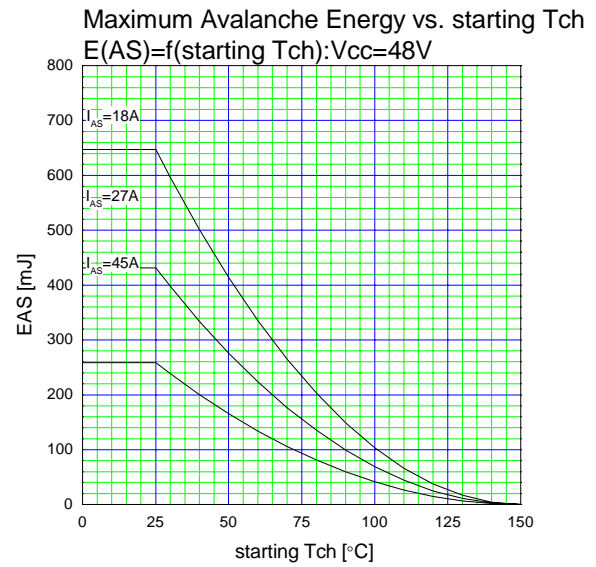
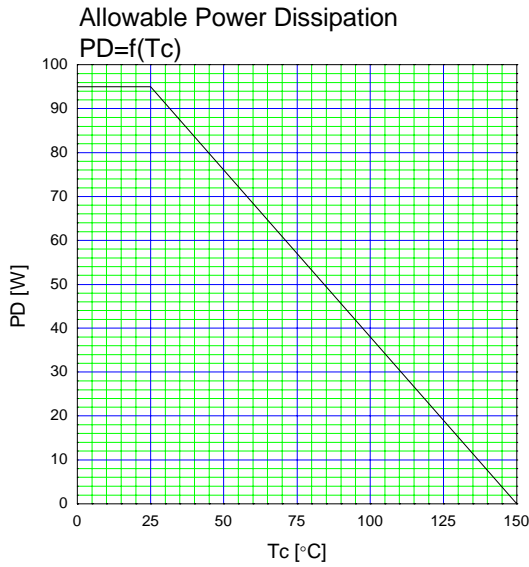
#### Outline Drawings (mm)



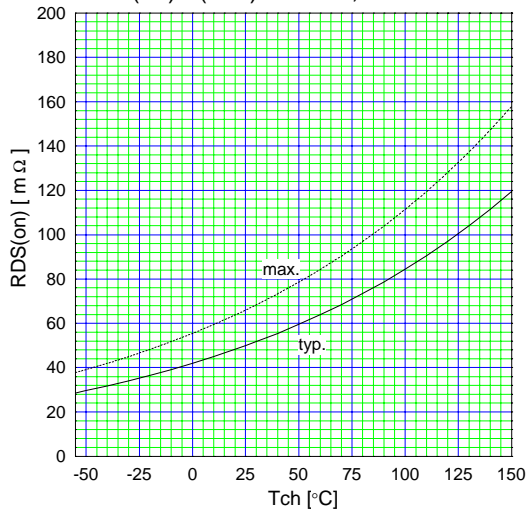
#### Equivalent circuit schematic



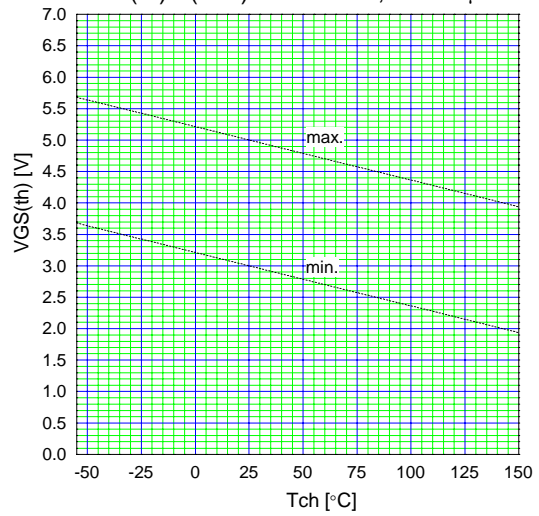
## Characteristics



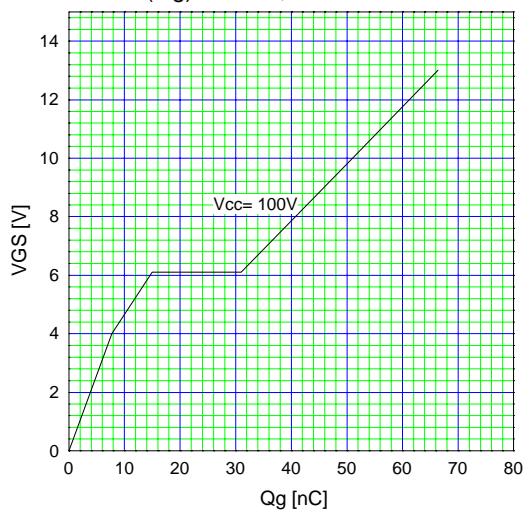
Drain-Source On-state Resistance  
 $R_{DS(on)} = f(T_{ch}): I_D = 15A, V_{GS} = 10V$



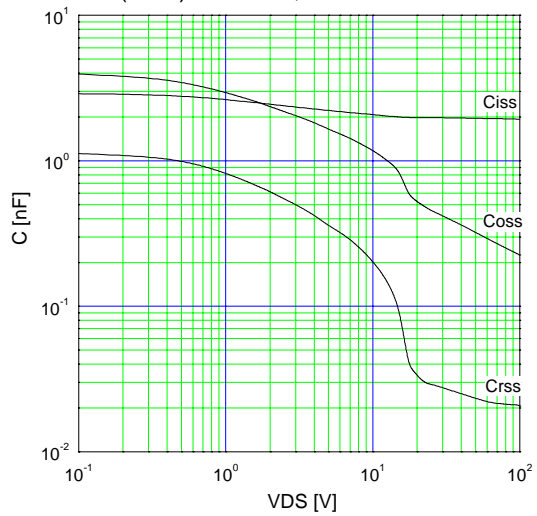
Gate Threshold Voltage vs. T<sub>ch</sub>  
 $V_{GS(th)} = f(T_{ch}): V_{DS} = V_{GS}, I_D = 250\mu A$



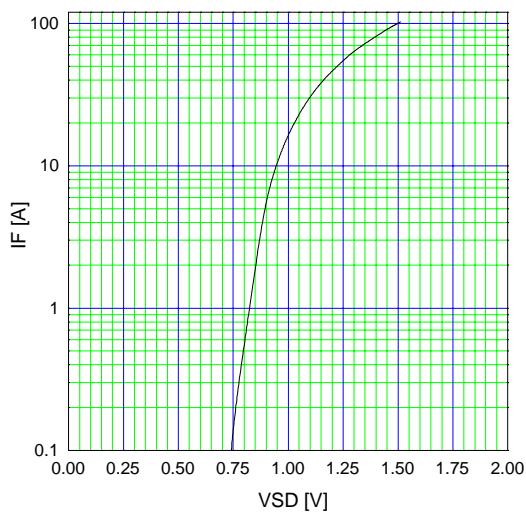
Typical Gate Charge Characteristics  
 $V_{GS} = f(Q_g): I_D = 30A, T_{ch} = 25^\circ C$



Typical Capacitance  
 $C = f(V_{DS}): V_{GS} = 0V, f = 1MHz$



Typical Forward Characteristics of Reverse Diode  
 $I_F = f(V_{SD}): 80\mu s \text{ Pulse test}, T_{ch} = 25^\circ C$



Typical Switching Characteristics vs. I<sub>D</sub>  
 $t = f(I_D): V_{CC} = 48V, V_{GS} = 10V, R_G = 10\Omega$

