

## N-CHANNEL SILICON POWER MOSFET

## FAP-IIIB SERIES

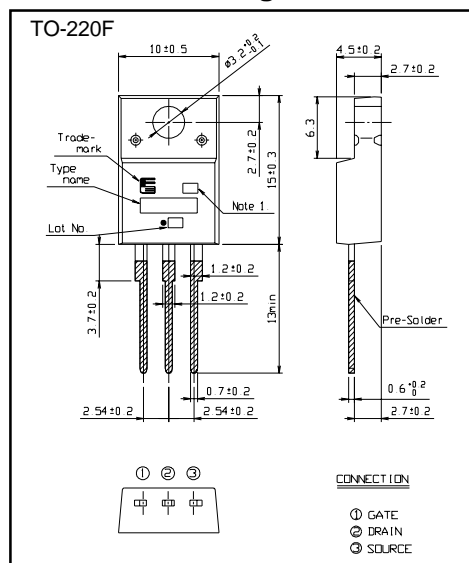
### Features

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

### Applications

- Switching regulators
- DC-DC converters
- General purpose power amplifier

### Outline Drawings



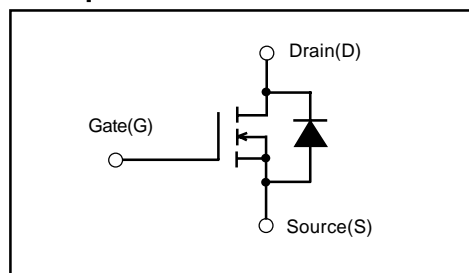
### Maximum ratings and characteristics

#### Absolute maximum ratings (T<sub>c</sub>=25°C unless otherwise specified)

Item	Symbol	Rating	Unit	Remarks
Drain-source voltage	V <sub>DS</sub>	30	V	
Continuous drain current	I <sub>D</sub>	±35	A	
Pulsed drain current	I <sub>D</sub> [puls]	±140	A	
Gate-source peak voltage	V <sub>GS</sub>	±16	V	
Maximum avalanche energy	E <sub>AV</sub>	129.3	mJ	*1
Maximum power dissipation	P <sub>D</sub>	20	W	
Operating and storage temperature range	T <sub>ch</sub>	+150	°C	
	T <sub>stg</sub>	-55 to +150	°C	

\*1 L=0.70mH, V<sub>CC</sub>=12V

### Equivalent circuit schematic



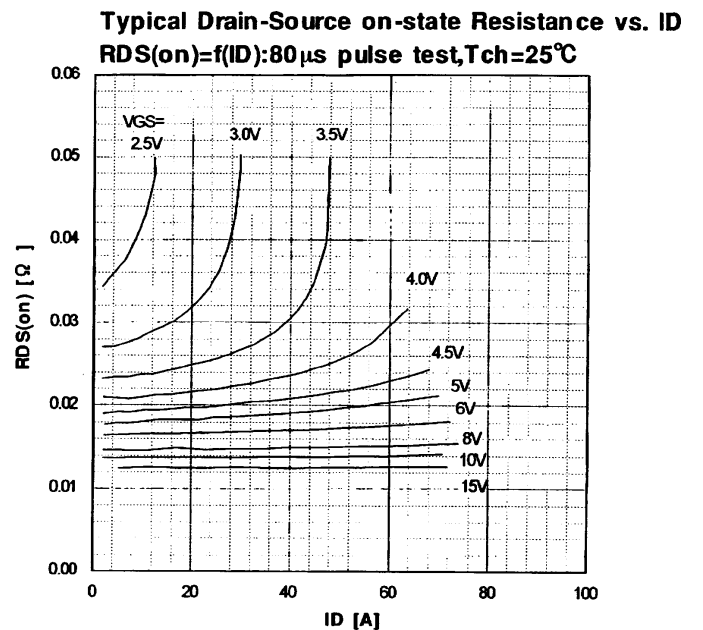
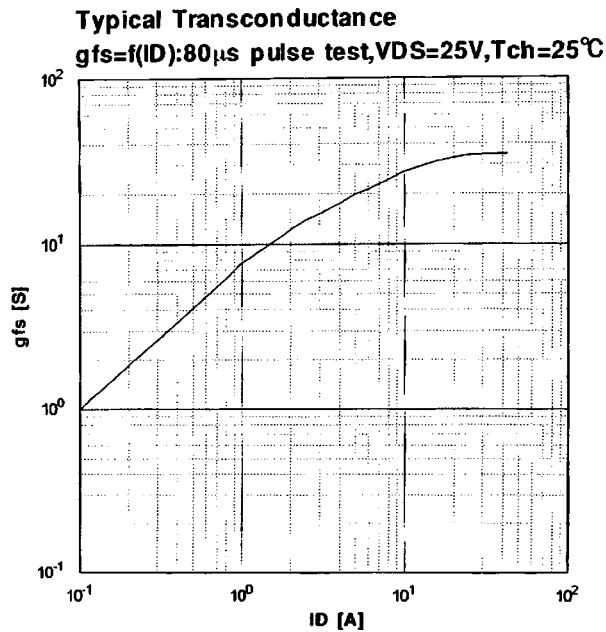
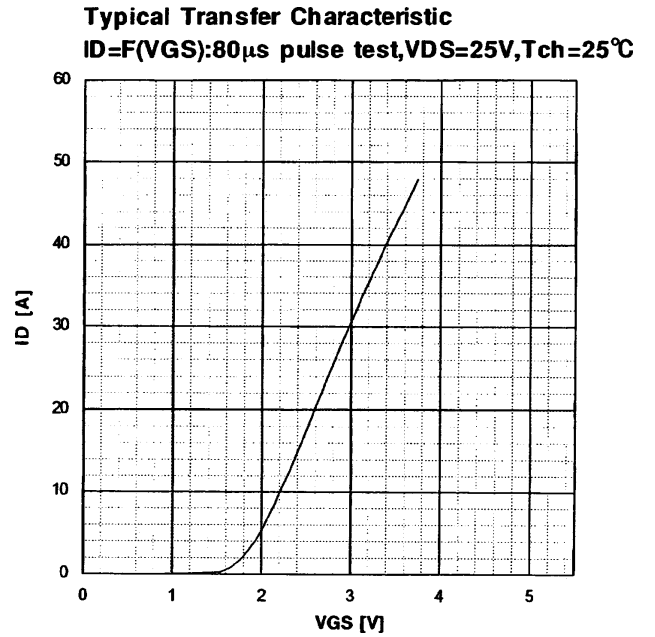
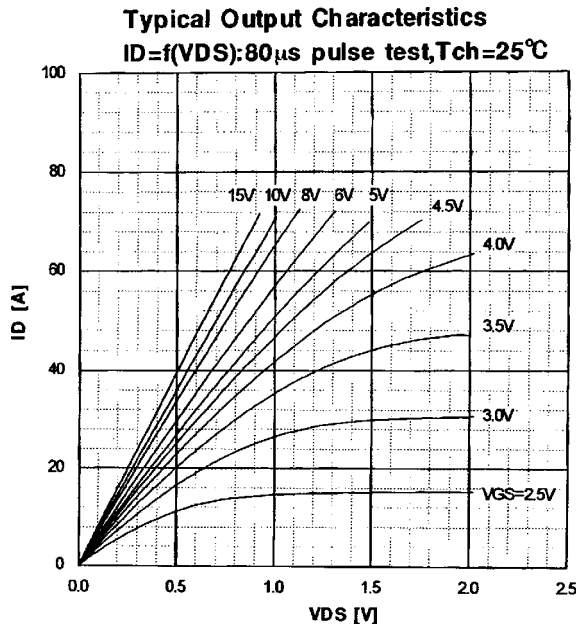
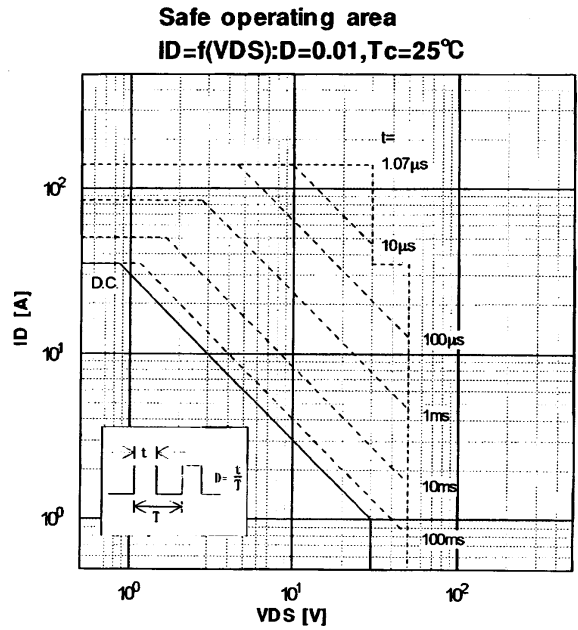
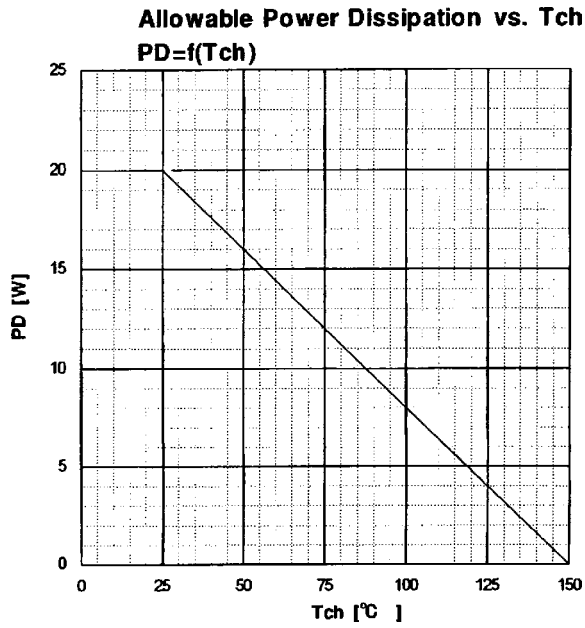
#### Electrical characteristics (T<sub>c</sub> =25°C unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =1mA V <sub>GS</sub> =0V	30			V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =1mA V <sub>DS</sub> =V <sub>GS</sub>	1.0	1.5	2.0	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V V <sub>GS</sub> =0V	T <sub>ch</sub> =25°C	10	500	μA
			T <sub>ch</sub> =125°C	0.2	1.0	mA
Gate-source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±16V V <sub>DS</sub> =0V		10	100	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =17.5A V <sub>GS</sub> =10V	V <sub>GS</sub> =4V	22	30	mΩ
			V <sub>GS</sub> =10V	14	20	mΩ
Forward transconductance	g <sub>fs</sub>	I <sub>D</sub> =17.5A V <sub>DS</sub> =25V	16	33		S
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V V <sub>GS</sub> =0V f=1MHz		1100	1650	pF
Output capacitance	C <sub>oss</sub>			550	830	
Reverse transfer capacitance	C <sub>rss</sub>			240	360	
Turn-on time	t <sub>d(on)</sub>	V <sub>CC</sub> =15V R <sub>G</sub> =10 Ω I <sub>D</sub> =35A V <sub>GS</sub> =10V		9	15	ns
	t <sub>r</sub>			15	23	
Turn-off time	t <sub>d(off)</sub>			75	115	
	t <sub>f</sub>			50	75	
Avalanche capability	I <sub>AV</sub>	L=100μH T <sub>ch</sub> =25°C	35			A
Diode forward on-voltage	V <sub>SD</sub>	I <sub>F</sub> =2xI <sub>DR</sub> V <sub>GS</sub> =0V T <sub>ch</sub> =25°C		0.98	1.71	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =2xI <sub>DR</sub> V <sub>GS</sub> =0V		50		ns
Reverse recovery charge	Q <sub>rr</sub>	-di/dt=100A/μs T <sub>ch</sub> =25°C		0.08		μC

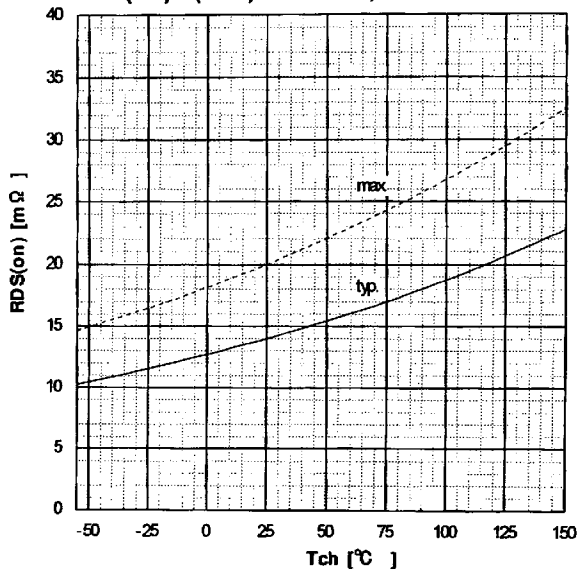
### Thermal characteristics

Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	R <sub>th(ch-c)</sub>			6.25	°C/W
	R <sub>th(ch-a)</sub>			62.5	°C/W

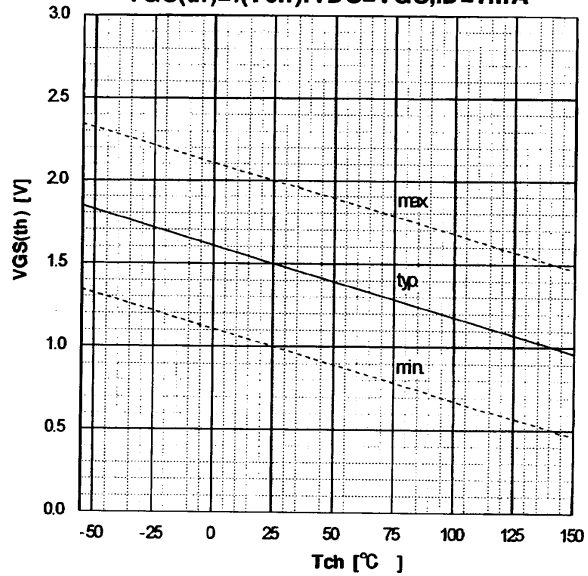
Characteristics



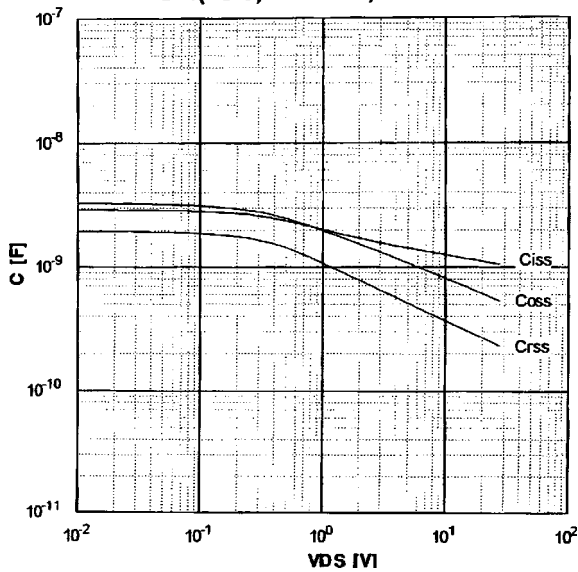
Drain-Source On-state Resistance vs. T<sub>ch</sub>  
 $R_{DS(on)}=f(T_{ch}):I_D=17.5A, V_{GS}=10V$



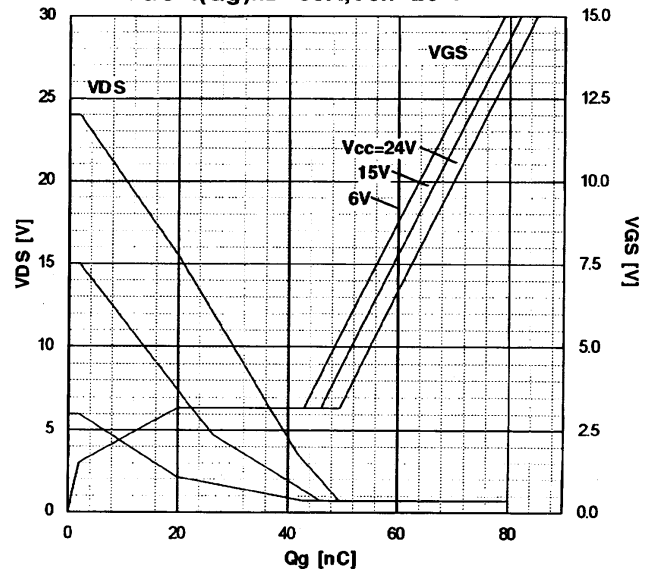
Gate Threshold Voltage vs. T<sub>ch</sub>  
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=1mA$



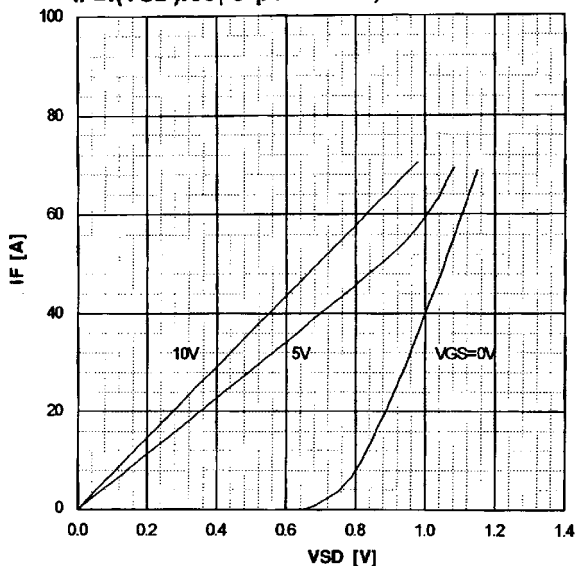
Typical Capacitances vs. V<sub>DS</sub>  
 $C=f(V_{DS}):V_{GS}=0V, f=1MHz$



Typical Gate Charge Characteristics  
 $V_{GS}=f(Q_g):I_D=35A, T_{ch}=25°C$



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



Typical Switching Characteristics vs. I<sub>D</sub>  
 $t=f(I_D):V_{CC}=15V, V_{GS}=10V, R_G=10\Omega$

