

N-CHANNEL SILICON POWER MOSFET

FAP-IIIB SERIES

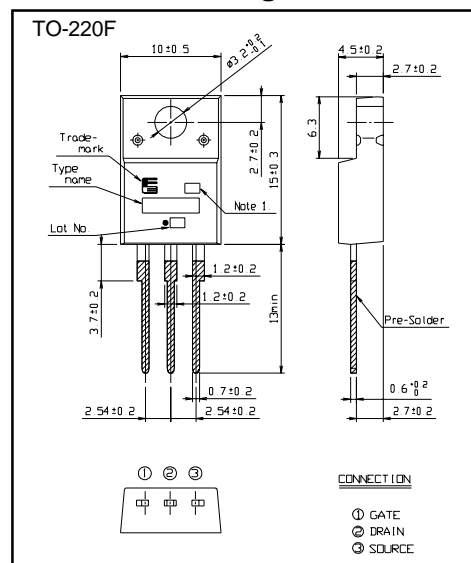
Features

- 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



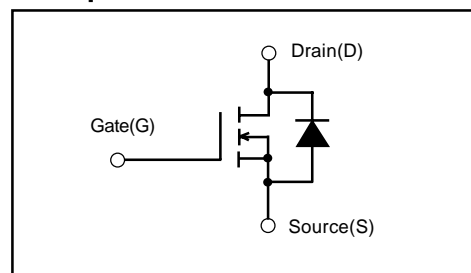
Maximum ratings and characteristics

Absolute maximum ratings (T_c=25°C unless otherwise specified)

Item	Symbol	Rating	Unit	Remarks
Drain-source voltage	V _{DS}	60	V	
Continuous drain current	I _D	±45	A	
Pulsed drain current	I _D [puls]	±180	A	
Gate-source peak voltage	V _{GS}	±20	V	
Maximum avalanche energy	E _{AV}	461.9	mJ	*1
Maximum power dissipation	P _D	40	W	
Operating and storage temperature range	T _{ch}	+150	°C	
	T _{stg}	-55 to +150	°C	

*1 L=0.304mH, V_{CC}=24V

Equivalent circuit schematic



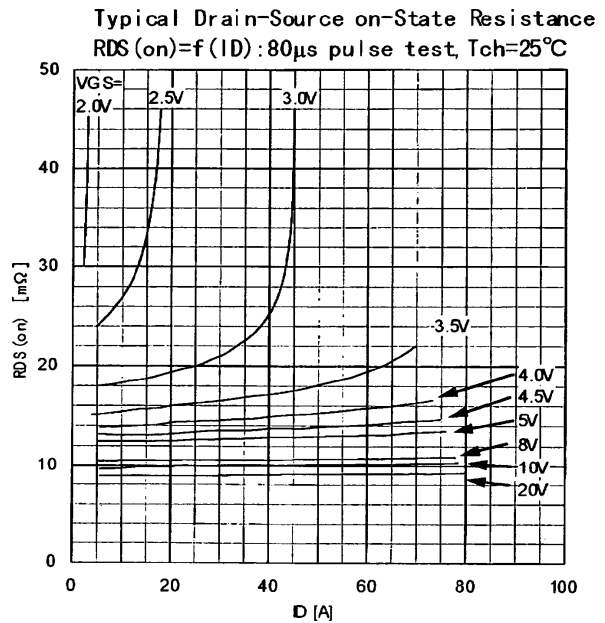
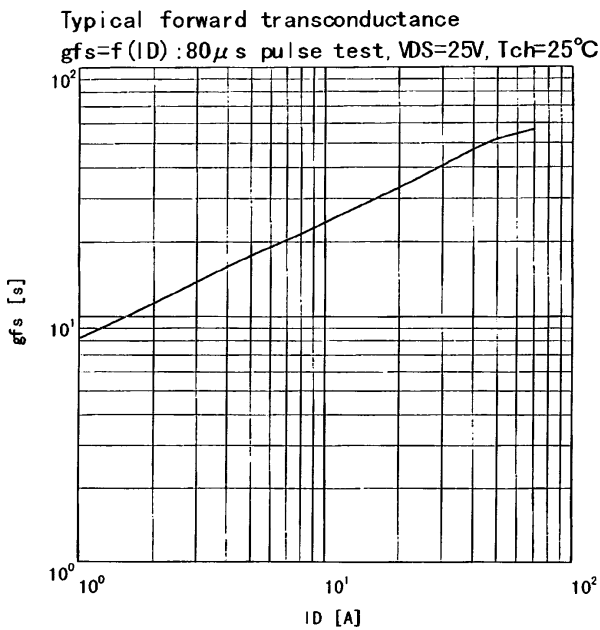
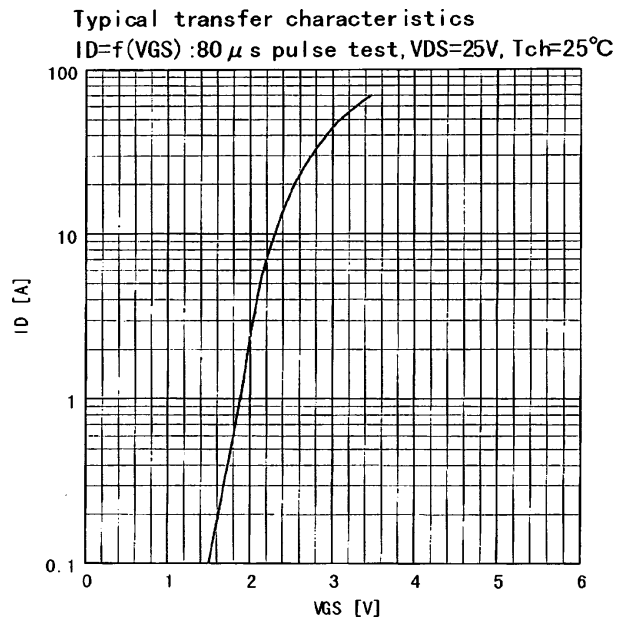
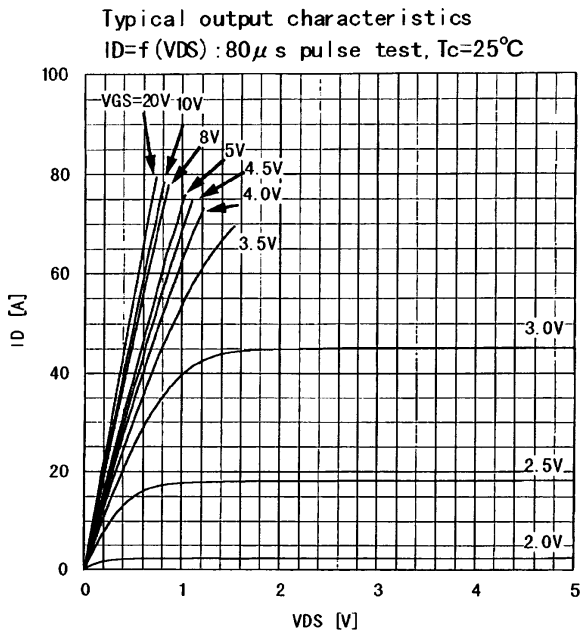
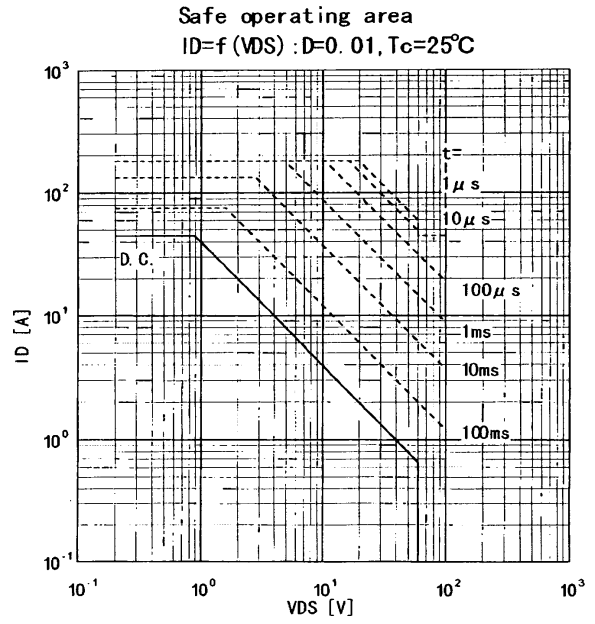
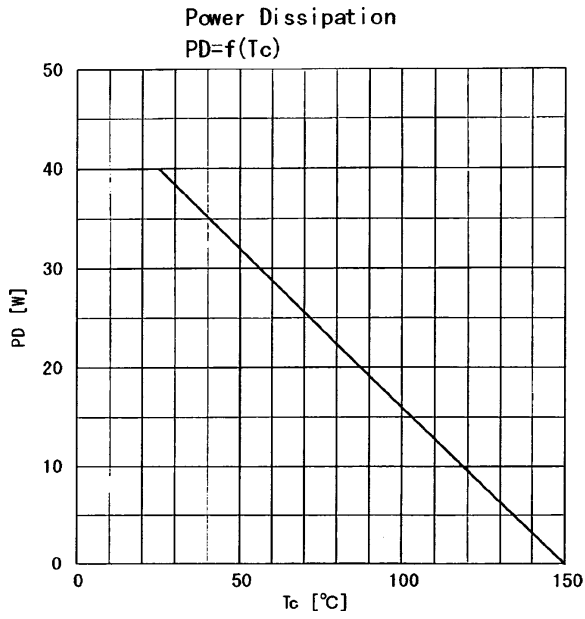
Electrical characteristics (T_c =25°C unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	V _{(BR)DSS}	I _D =1mA V _{GS} =0V	60			V
Gate threshold voltage	V _{GS(th)}	I _D =1mA V _{DS} =V _{GS}	1.0	1.5	2.0	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V V _{GS} =0V	T _{ch} =25°C	10	500	μA
			T _{ch} =125°C	0.2	1.0	mA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V V _{DS} =0V		10	100	nA
Drain-source on-state resistance	R _{DS(on)}	I _D =22.5A V _{GS} =10V	V _{GS} =4V	15	20	mΩ
			V _{GS} =10V	10	12	mΩ
Forward transconductance	g _{fs}	I _D =22.5A V _{DS} =25V	15	35		S
Input capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1MHz		2900	4350	pF
Output capacitance	C _{oss}			930	1400	
Reverse transfer capacitance	C _{rss}			260	390	
Turn-on time	t _{d(on)}	V _{CC} =30V R _G =10 Ω I _D =45A V _{GS} =10V		13	30	ns
	t _r			35	50	
Turn-off time	t _{d(off)}			190	290	
	t _f			75	140	
Avalanche capability	I _{AV}	L=100μH T _{ch} =25°C	45			A
Diode forward on-voltage	V _{SD}	I _F =45A V _{GS} =0V T _{ch} =25°C		0.95	1.43	V
Reverse recovery time	t _{rr}	I _F =45A		55		ns
Reverse recovery charge	Q _{rr}	-di/dt=100A/μs T _{ch} =25°C		0.10		μC

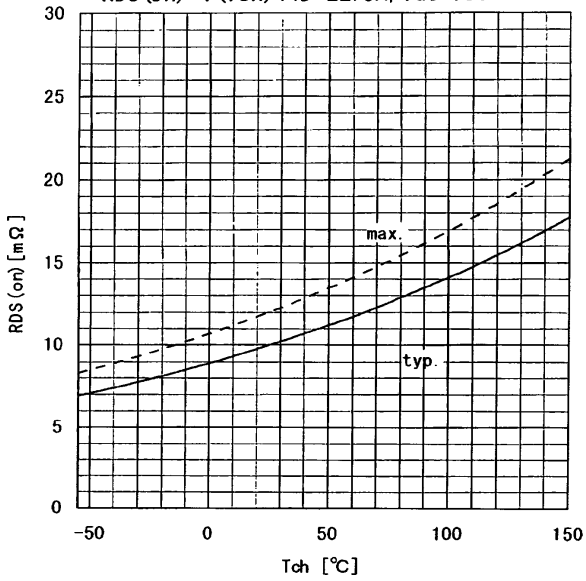
Thermal characteristics

Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	R _{th(ch-c)}			3.125	°C/W
	R _{th(ch-a)}			62.5	°C/W

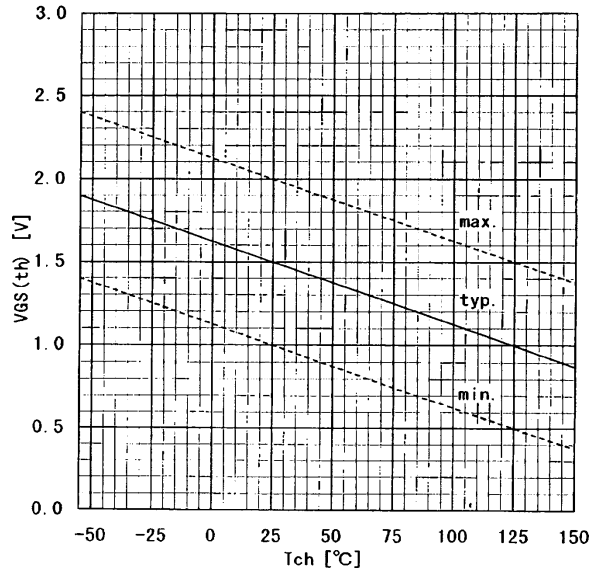
Characteristics



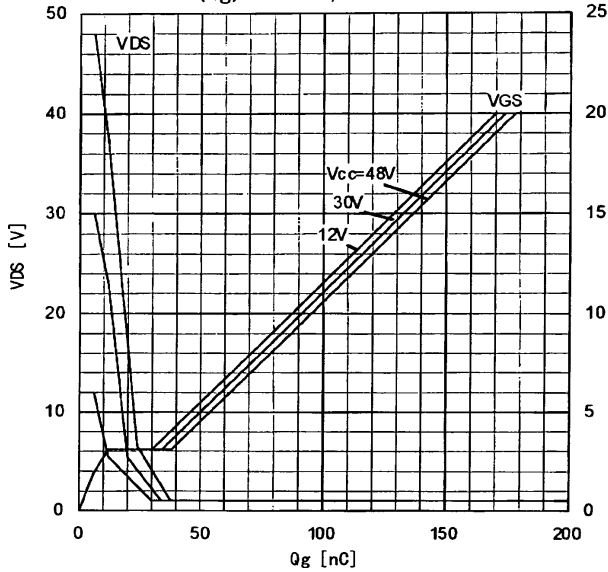
Drain-source on-state resistance
 $R_{DS(on)} = f(T_{ch}) : I_D = 22.5A, V_{GS} = 10V$



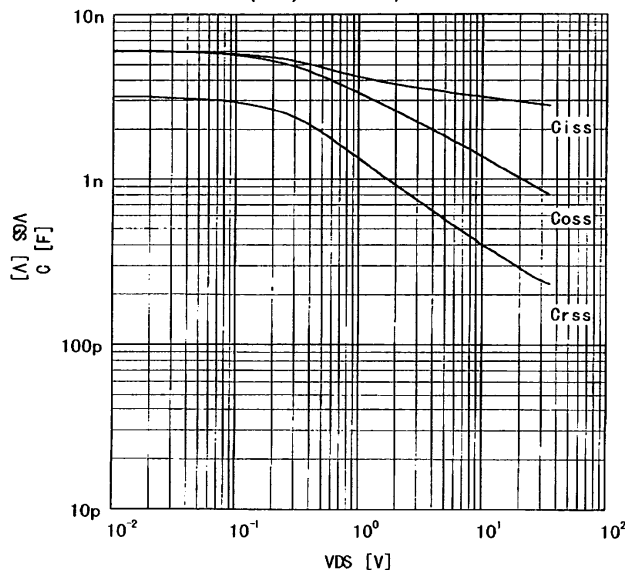
Gate Threshold Voltage vs. Tch
 $V_{GS(th)} = f(T_{ch}) : V_{DS} = V_{GS}, I_D = 1mA$



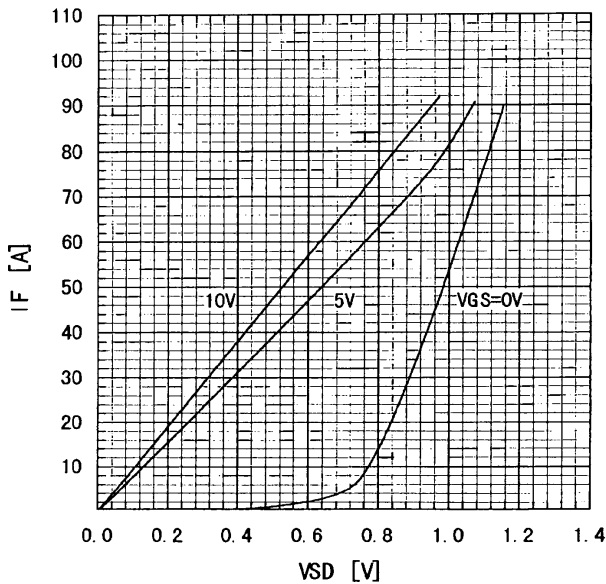
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g) : I_D = 45A, T_{ch} = 25°C$



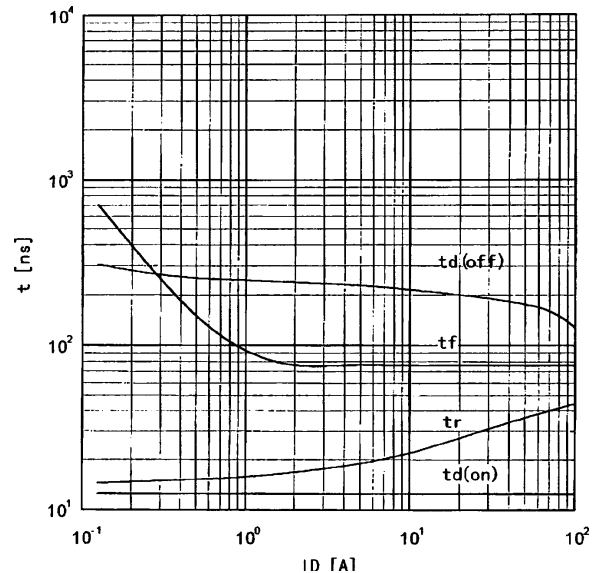
Typical capacitances
 $C = f(V_{DS}) : V_{GS} = 0V, f = 1MHz$



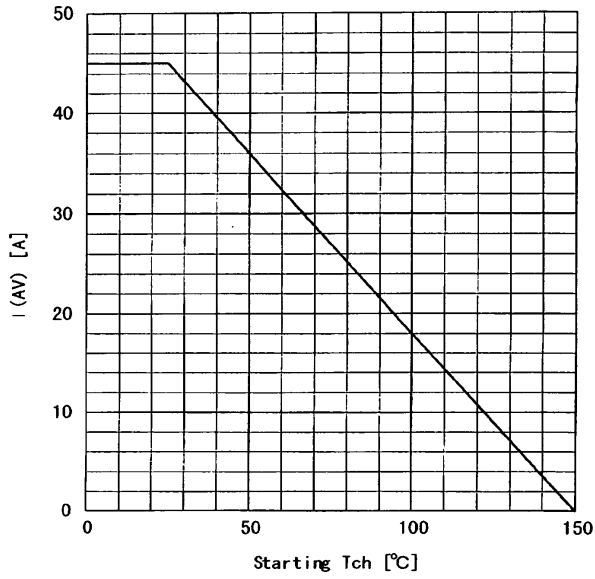
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD}) : 80\mu s \text{ pulse test}, T_{ch} = 25°C$



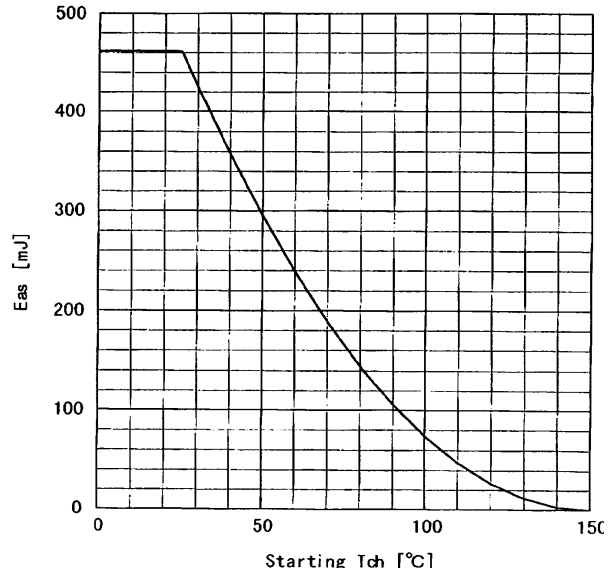
Typical Switching Characteristics vs. ID
 $t = f(I_D) : V_{CC} = 30V, V_{GS} = 10V, R_G = 10\Omega$



Maximum Avalanche Current vs. starting Tch
 $I_{(AV)} = f(\text{starting Tch})$



Maximum Avalanche energy vs. starting Tch
 $E_{as} = f(\text{starting Tch}) : V_{cc} = 24V, I_{AV} \leq 45A$



Transient thermal impedance
 $Z_{thch} = f(t)$ parameter : $D = t/T$

