

N-CHANNEL SILICON POWER MOSFET

FAP-IIIB SERIES

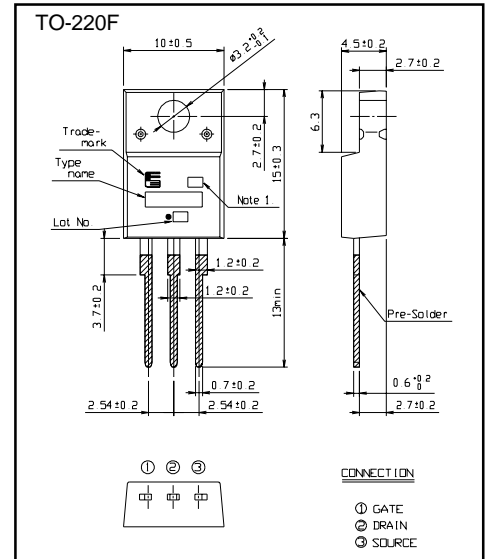
Features

- 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



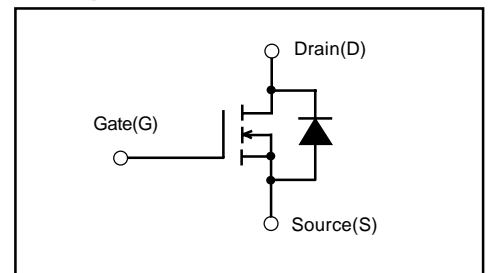
Maximum ratings and characteristics

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

Item	Symbol	Rating	Unit	Remarks
Drain-source voltage	V _{DS}	60	V	
Continuous drain current	I _D	±50	A	
Pulsed drain current	I _D [puls]	±200	A	
Gate-source peak voltage	V _{GS}	±20	V	
Maximum avalanche energy	E _{AV}	453	mJ	*1
Maximum power dissipation	P _D	50	W	
Operating and storage temperature range	T _{ch}	+150	°C	
	T _{stg}	-55 to +150	°C	

*1 L=0.241mH, V_{CC}=24V

Equivalent circuit schematic



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

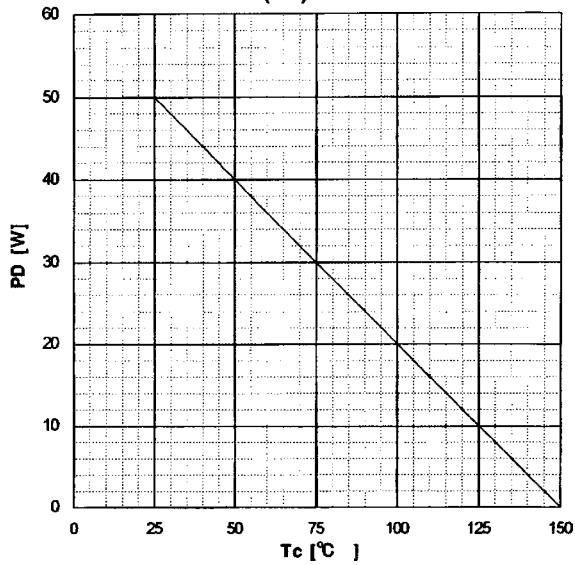
Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
Drain-source breakdown voltage	V _{(BR)DSS}	I _D =1mA V _{GS} =0V	60			V	
Gate threshold voltage	V _{GS(th)}	I _D =1mA V _{DS} =V _{GS}	1.0	1.5	2.0	V	
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V V _{GS} =0V	T _{ch} =25°C		10	500	μA
			T _{ch} =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 =40A V _{GS} =10V	V _{GS} =4V	12	17	mΩ	
			V _{GS} =10V	7.5	10	mΩ	
Forward transconductance	g _{fs}	I _D =40A V _{DS} =25V	25	55		S	
Input capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1MHz		3500	5250	pF	
Output capacitance	C _{oss}			1250	1870		
Reverse transfer capacitance	C _{rss}			360	540		
Turn-on time	t _{d(on)}	V _{CC} =30V R _G =10 Ω I _D =75A V _{GS} =10V		15	23	ns	
	t _r			75	120		
Turn-off time	t _{d(off)}			190	285		
	t _f			110	165		
Avalanche capability	I _{AV}	L=100μH T _{ch} =25°C	50			A	
Diode forward on-voltage	V _{SD}	I _F =160A V _{GS} =0V T _{ch} =25°C		1.15	1.65	V	
Reverse recovery time	t _{rr}	I _F =80A		75	120	ns	
Reverse recovery charge	Q _{rr}	-di/dt=100A/μs T _{ch} =25°C		0.17		μC	

Thermal characteristics

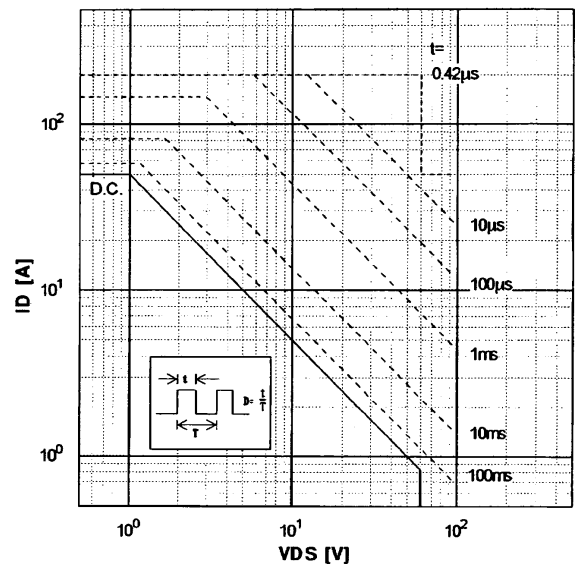
Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	R _{th(ch-c)}			2.50	°C/W
	R _{th(ch-a)}			62.5	°C/W

Characteristics

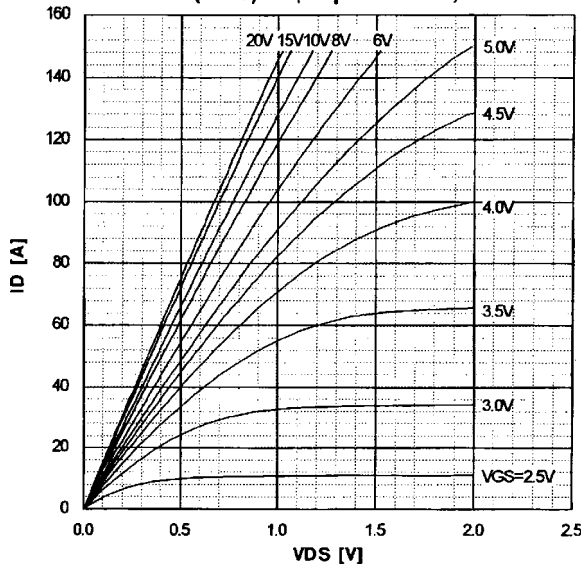
Power Dissipation
 $PD=f(T_c)$



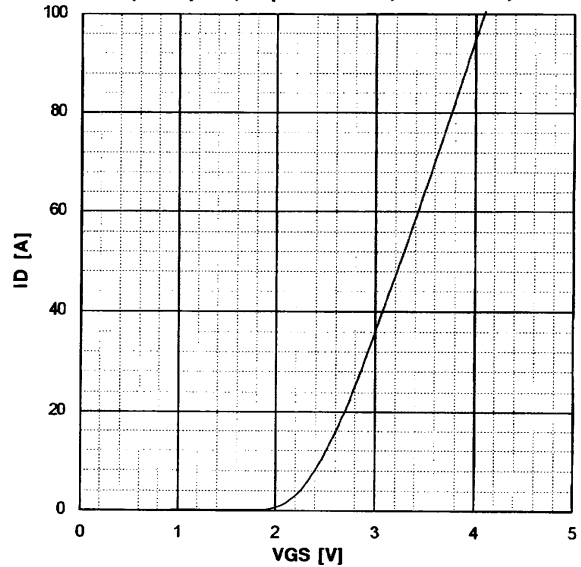
Safe operating area
 $ID=f(V_{DS}):D=0.01, T_c=25^\circ C$



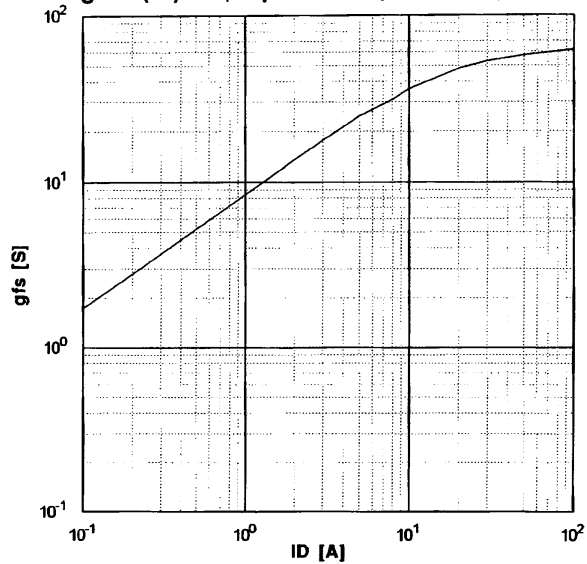
Typical Output Characteristics
 $ID=f(V_{DS}):80\mu s \text{ pulse test}, T_{ch}=25^\circ C$



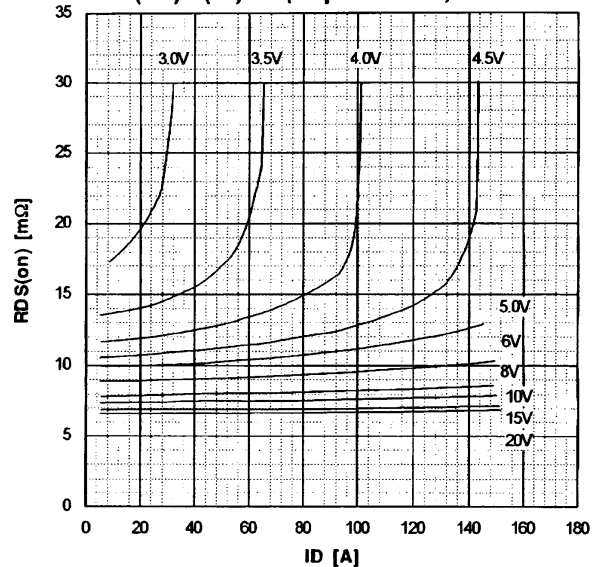
Typical Transfer Characteristic
 $ID=f(V_{GS}):80\mu s \text{ pulse test}, V_{DS}=25V, T_{ch}=25^\circ C$



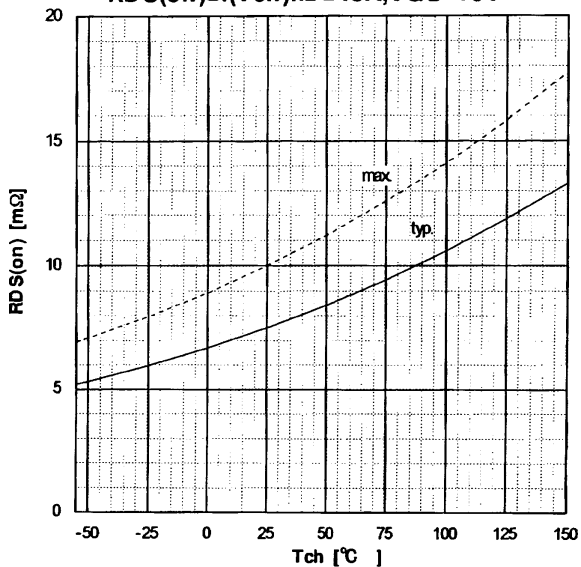
Typical Transconductance
 $g_{fs}=f(ID):80\mu s \text{ pulse test}, V_{DS}=25V, T_{ch}=25^\circ C$



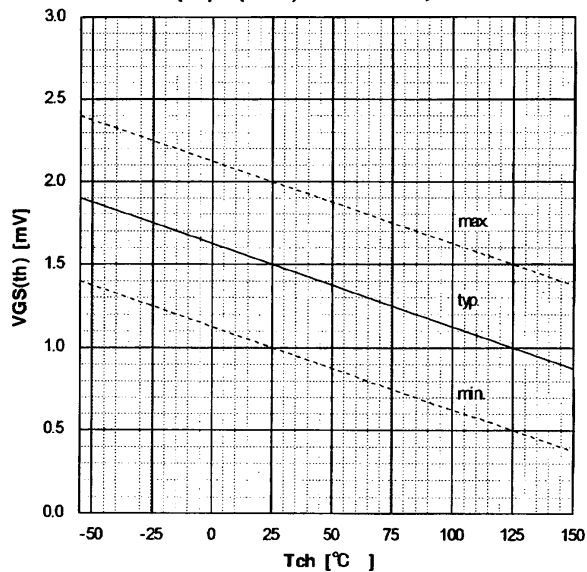
Typical Drain-Source on-State Resistance
 $R_{DS(on)}=f(ID):80\mu s \text{ pulse test}, T_{ch}=25^\circ C$



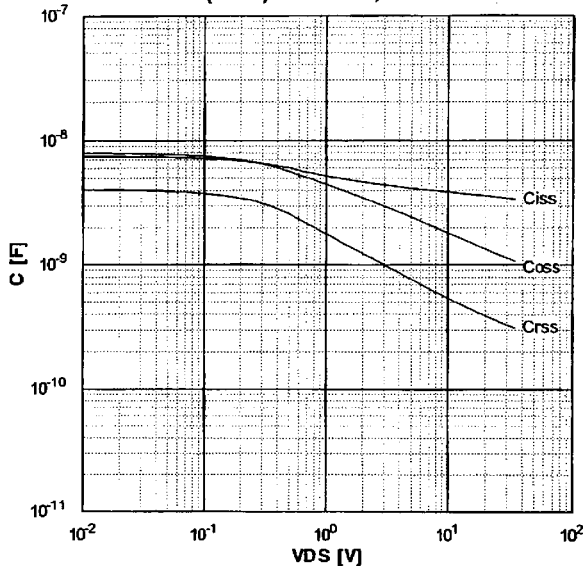
Drain-Source On-state Resistance
 $R_{DS(on)} = f(T_{ch}): I_D = 40A, V_{GS} = 10V$



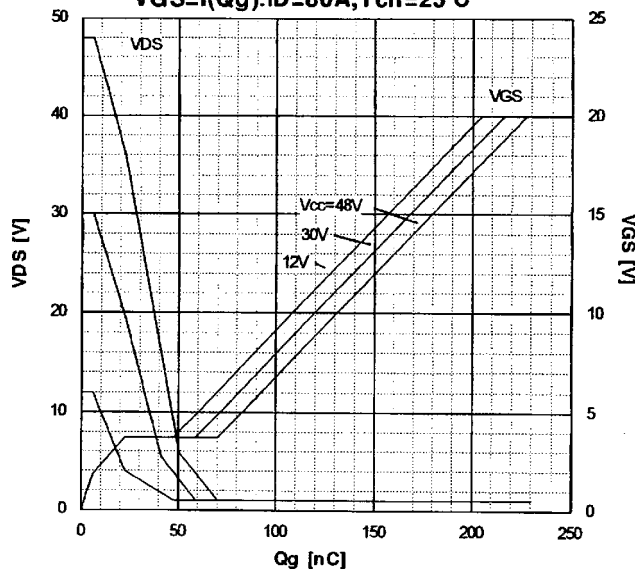
Gate Threshold Voltage vs. Tch
 $V_{GS(th)} = f(T_{ch}): V_{DS} = V_{GS}, I_D = 1mA$



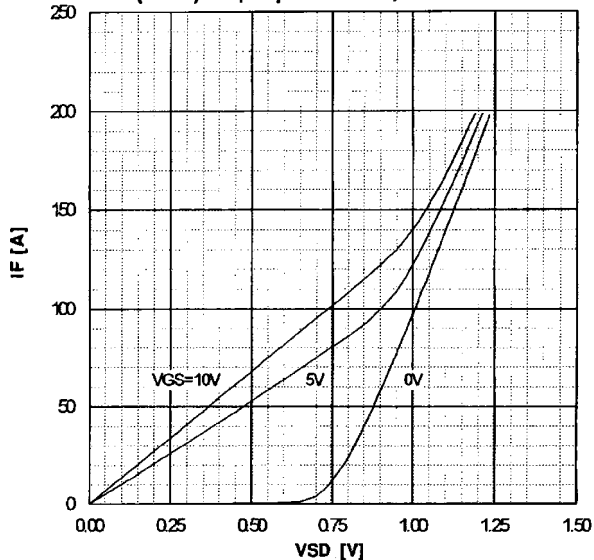
Typical Capacitance
 $C = f(V_{DS}): V_{GS} = 0V, f = 1MHz$



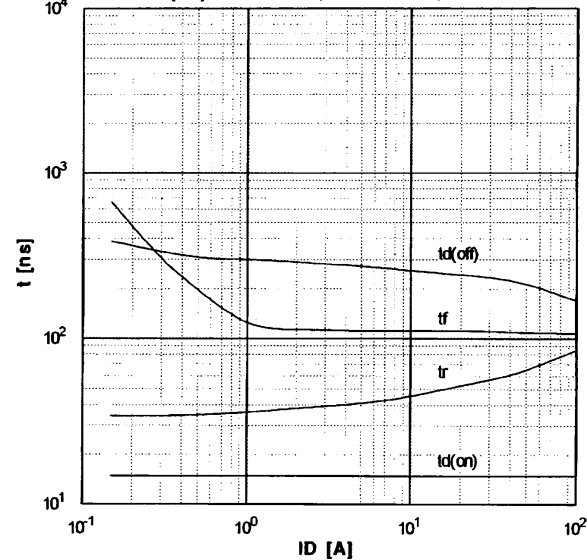
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g): I_D = 80A, T_{ch} = 25°C$



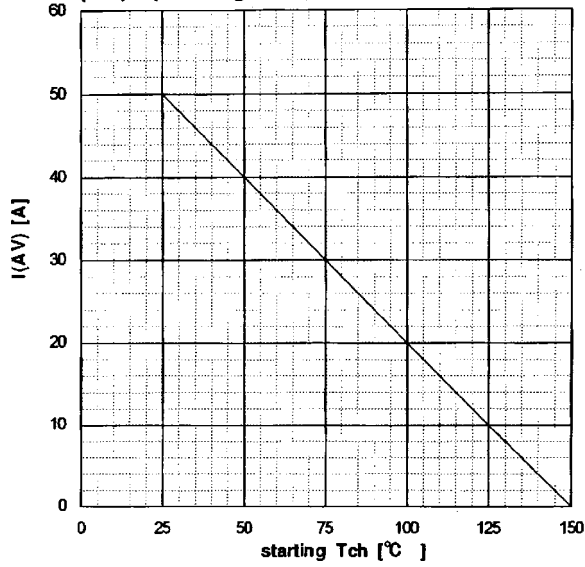
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD}): 80\mu s \text{ pulse test}, T_{ch} = 25°C$



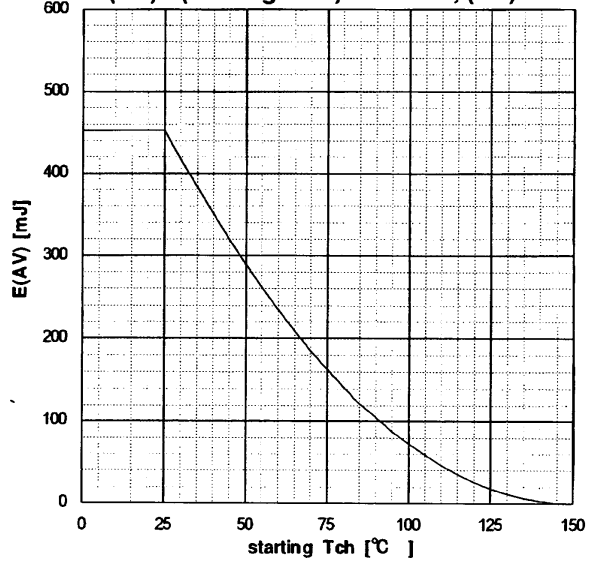
Typical Switching Characteristics vs. ID
 $t = f(I_D): V_{cc} = 30V, V_{GS} = 10V, R_G = 10\Omega$



Maximum Avalanche Current vs. starting T_{ch}
 $I(AV)=f(\text{starting } T_{ch})$



Maximum Avalanche Energy vs. starting T_{ch}
 $E(AV)=f(\text{starting } T_{ch}); V_{cc}=24V, I(AV) \leq 50A$



Transient Thermal impedance
 $Z_{th}(ch-c)=f(t)$ parameter: $D=t/T$

