

N-CHANNEL SILICON POWER MOSFET

FAP-IIIB SERIES

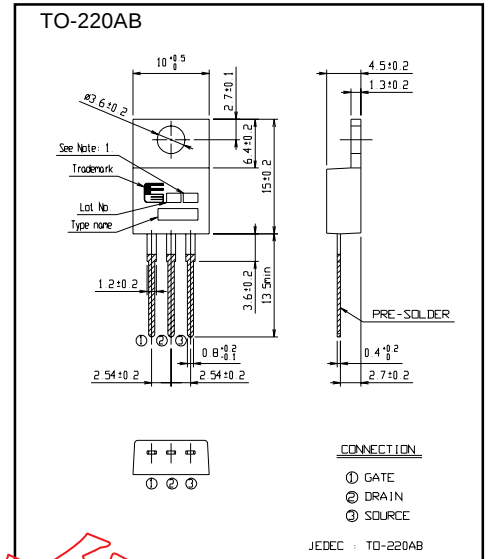
■ Features

- 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



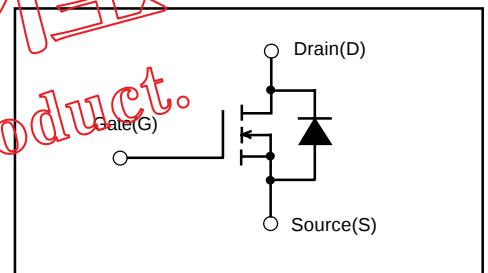
■ Maximum ratings and characteristics

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

Item	Symbol	Rating	Unit	Remarks
Drain-source voltage	V_{DS}	30	V	
Continuous drain current	I_D	±50	A	
Pulsed drain current	$I_{D(puls)}$	±200	A	
Gate-source peak voltage	V_{GS}	±16	V	
Maximum avalanche energy	E_{AV}	520	mJ	*1
Maximum power dissipation	P_D	60	W	
Operating and storage temperature range	T_{ch} T_{stg}	150 -55 to +150	$^\circ\text{C}$	

*1 $L=0.277\text{mH}$, $V_{CC}=12\text{V}$

■ Equivalent circuit schematic

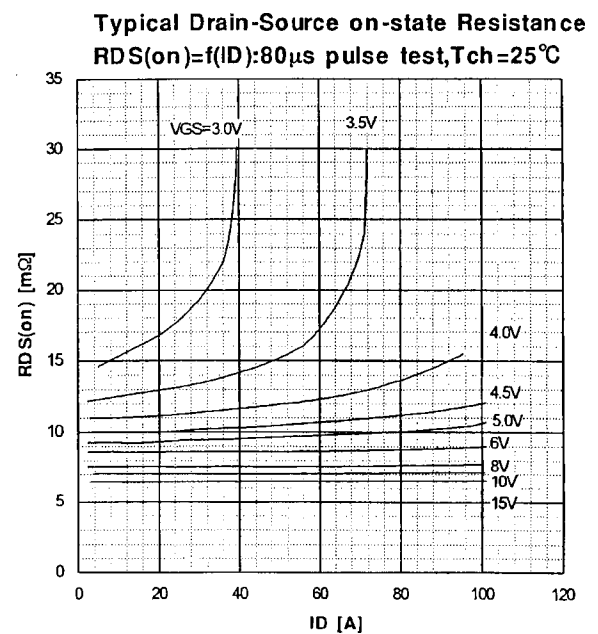
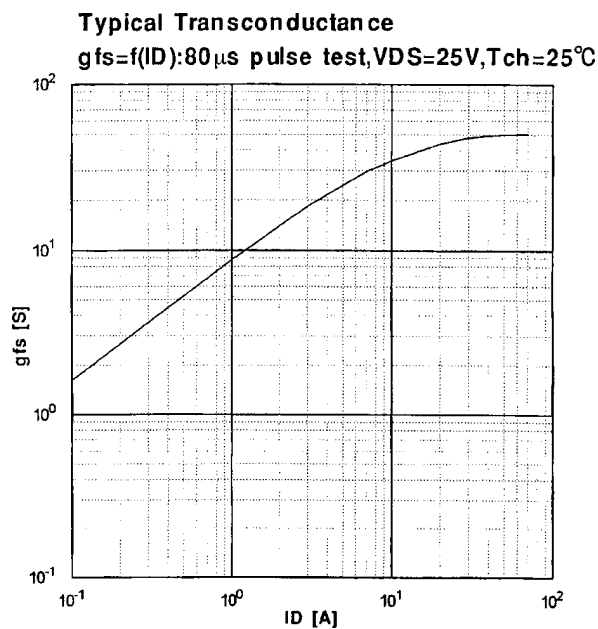
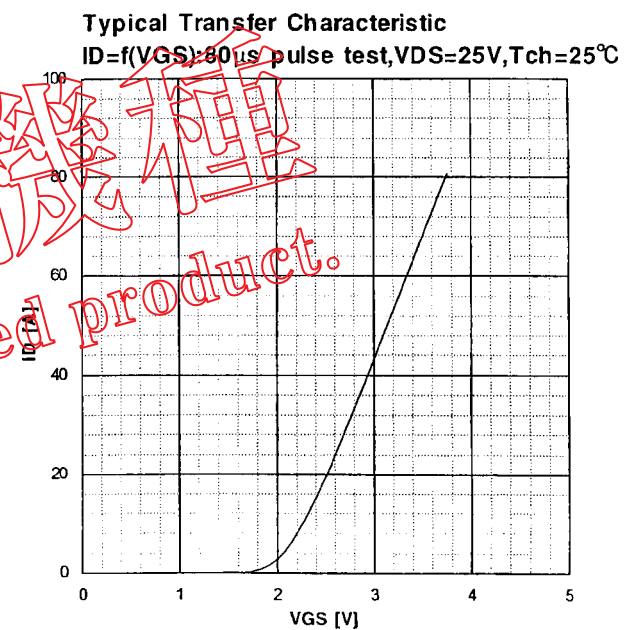
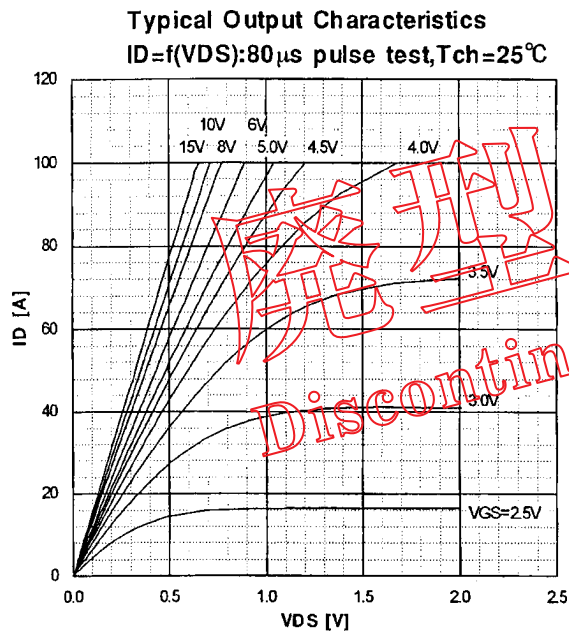
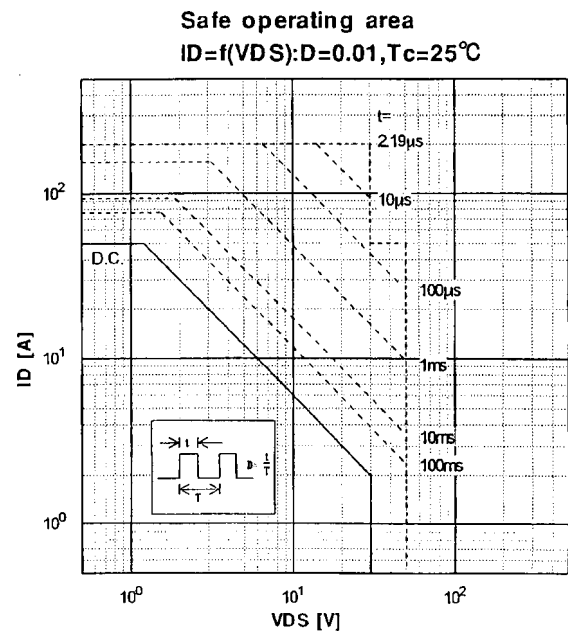
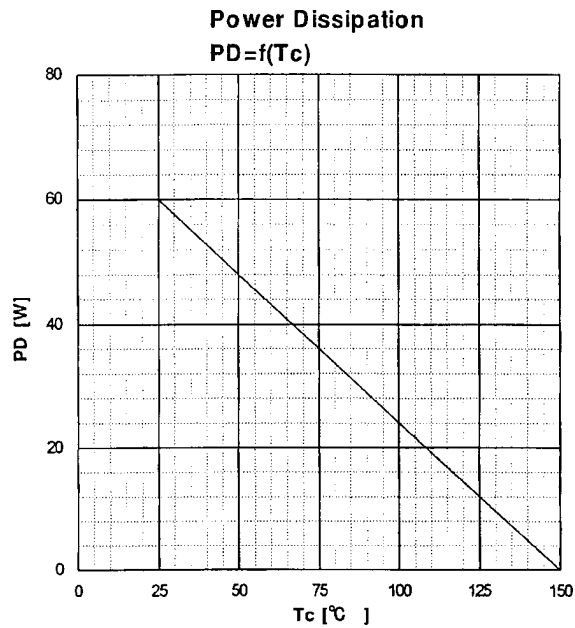
● Electrical characteristics ($T_c=25^\circ\text{C}$ unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=1\text{mA}$ $V_{GS}=0\text{V}$	30			V
Gate threshold voltage	$V_{GS(th)}$	$I_D=1\text{mA}$ $V_{DS}=V_{GS}$	1.0	1.5	2.0	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30\text{V}$ $V_{GS}=0\text{V}$		10	500	μA
				0.2	1.0	mA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 16\text{V}$ $V_{DS}=0\text{V}$		10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=25\text{A}$ $V_{GS}=10\text{V}$	$V_{GS}=4\text{V}$	12	17	$\text{m}\Omega$
			$V_{GS}=10\text{V}$	7.5	10	$\text{m}\Omega$
Forward transconductance	g_{fs}	$I_D=25\text{A}$ $V_{DS}=25\text{V}$	22	45		S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$		2750	4130	pF
Output capacitance	C_{oss}	$V_{GS}=0\text{V}$		1300	1950	
Reverse transfer capacitance	C_{rss}	$f=1\text{MHz}$		600	900	
Turn-on time	$t_{d(on)}$	$V_{CC}=15\text{V}$ $R_G=10\Omega$		13	20	ns
	t_r			55	83	
Turn-off time	$t_{d(off)}$	$V_{GS}=10\text{V}$		180	270	
	t_f			150	230	
Avalanche capability	I_{AV}	$L=100\mu\text{H}$ $T_{ch}=25^\circ\text{C}$	50			A
Diode forward on-voltage	V_{SD}	$I_F=2I_{LDR}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$		1.14	1.71	V
Reverse recovery time	t_{rr}	$I_F=2I_{LDR}$ $V_{GS}=0\text{V}$		85	130	ns
Reverse recovery charge	Q_{rr}	$-di/dt=100\text{A}/\mu\text{s}$ $T_{ch}=25^\circ\text{C}$		0.17		μC

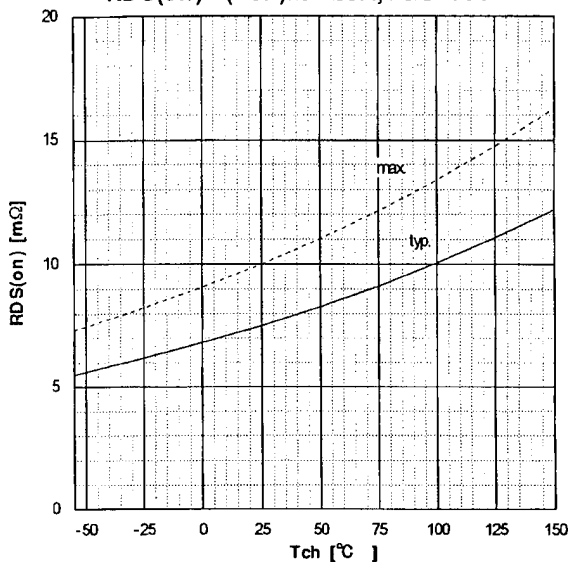
● Thermal characteristics

Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-c)}$			2.08	$^\circ\text{C}/\text{W}$
	$R_{th(ch-a)}$			75.0	$^\circ\text{C}/\text{W}$

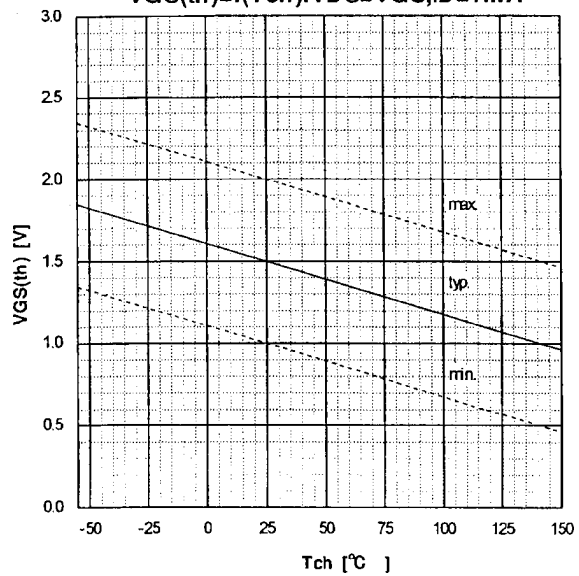
Characteristics



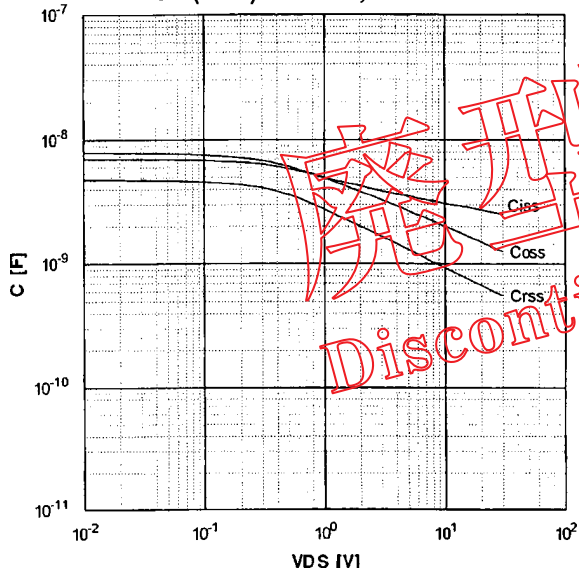
Drain-Source On-state Resistance
 $R_{DS(on)} = f(T_{ch})$; $I_D = 25A, V_{GS} = 10V$



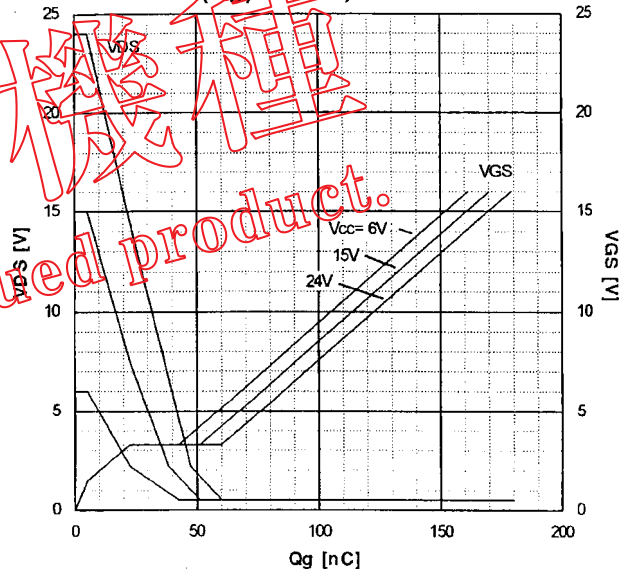
Gate Threshold Voltage
 $V_{GS(th)} = f(T_{ch})$; $V_{DS} = V_{GS}, I_D = 1mA$



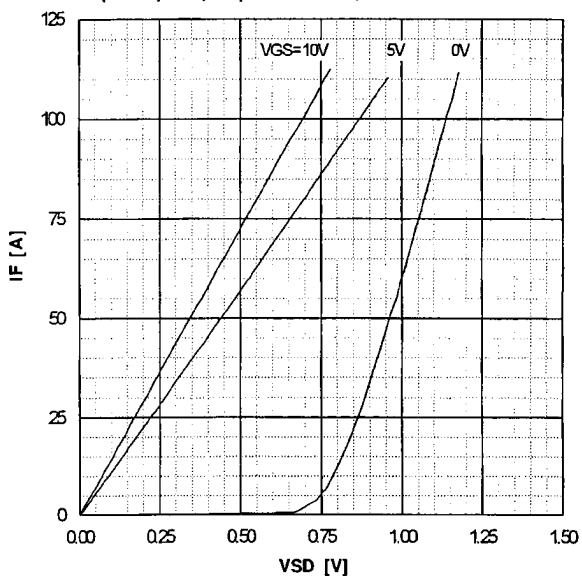
Typical Capacitance
 $C = f(V_{DS})$; $V_{GS} = 0V, f = 1MHz$



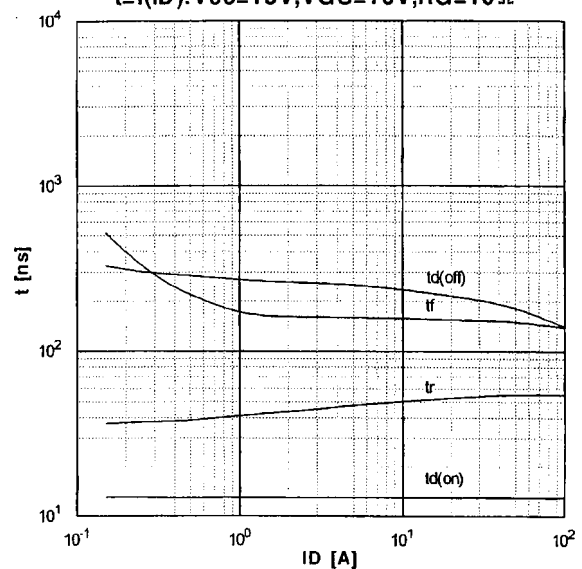
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g)$; $I_D = 50A, T_{ch} = 25^{\circ}C$



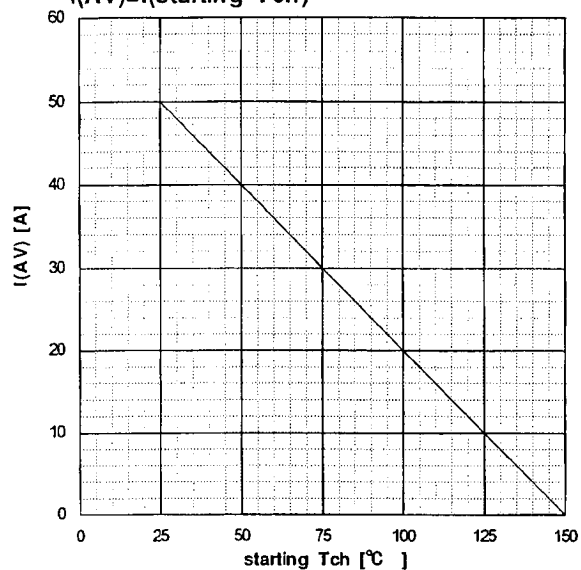
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD})$; 80 μs pulse test, $T_{ch} = 25^{\circ}C$



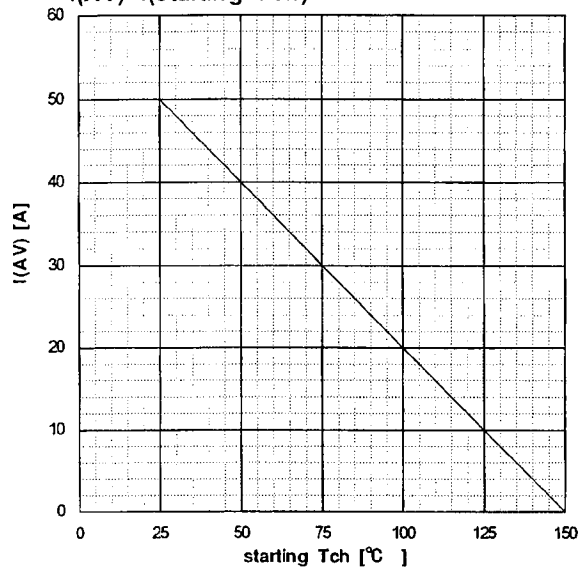
Typical Switching Characteristics vs. I_D
 $t = f(I_D)$; $V_{CC} = 15V, V_{GS} = 10V, R_G = 10\Omega$



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



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



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

