

N-CHANNEL SILICON POWER MOSFET

FAP-III B SERIES

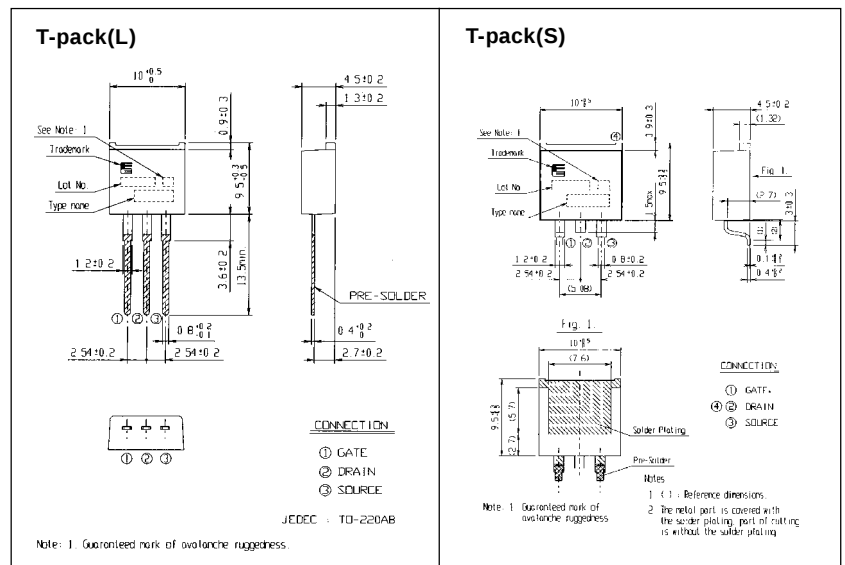
■ Features

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

■ Applications

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

■ Outline Drawings



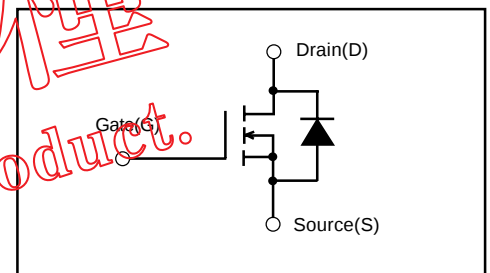
■ Maximum ratings and characteristics

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

Item	Symbol	Rating	Unit	Remarks
Drain-source voltage	V_{DS}	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	($T_c=25^\circ\text{C}$)
Maximum power dissipation	P_D	60	W	
Operating and storage temperature range	T_{ch}	-55 to +150	$^\circ\text{C}$	

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

■ Equivalent circuit schematic

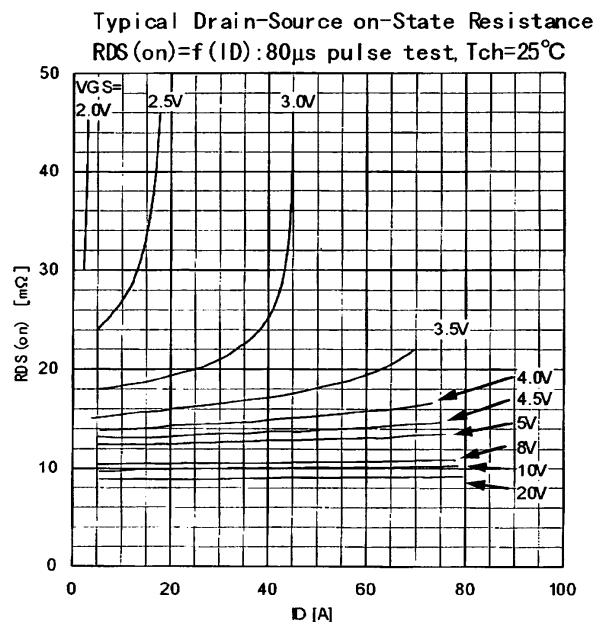
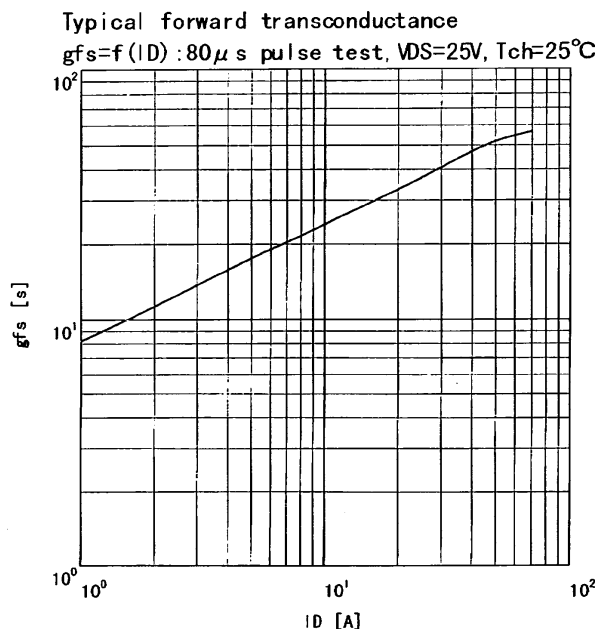
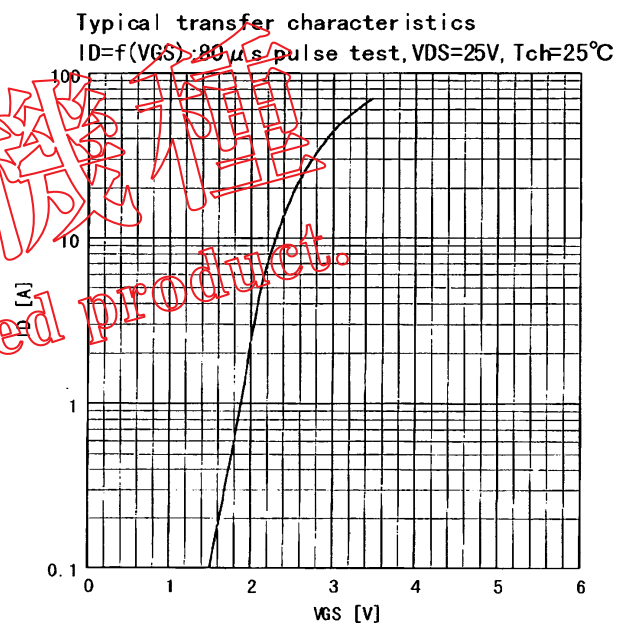
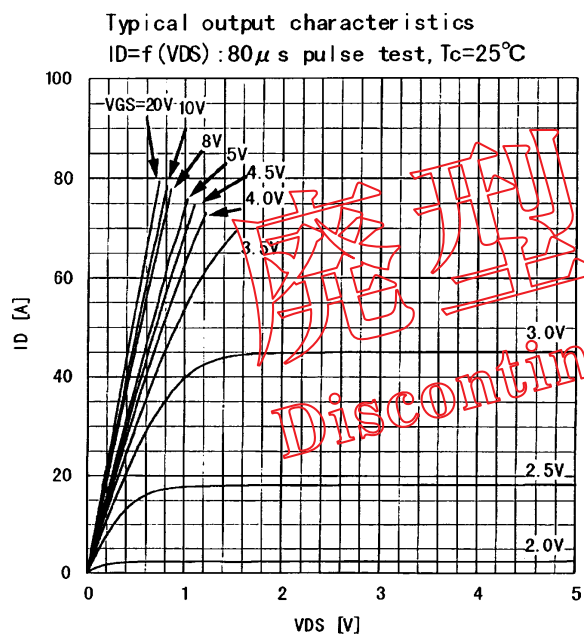
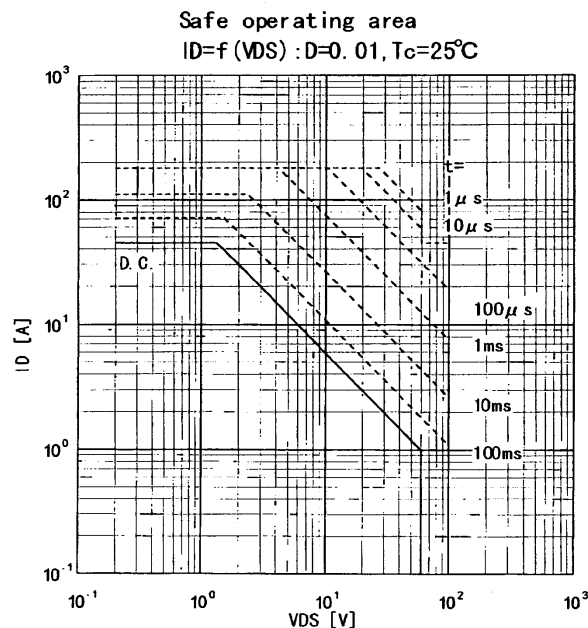
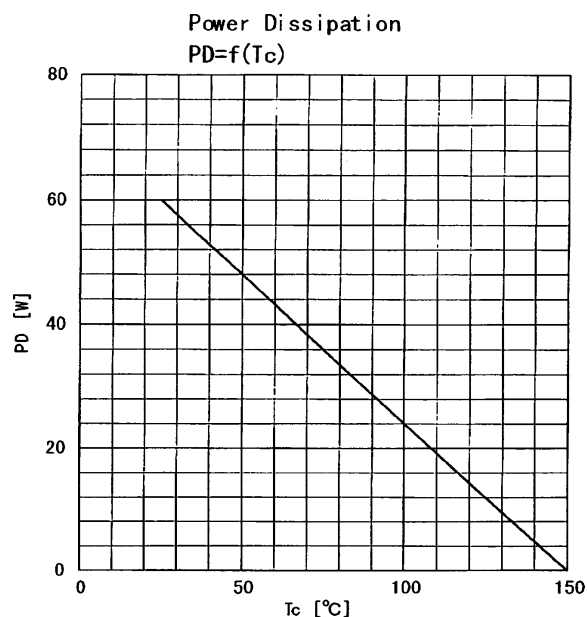
● Electrical characteristics ($T_c=25^\circ\text{C}$ unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=1\text{mA}$ $V_{GS}=0\text{V}$	60			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}	$V_{DS}=60\text{V}$ $V_{GS}=0\text{V}$		10	500	μA
				0.2	1.0	mA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$ $V_{DS}=0\text{V}$		10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=22.5\text{A}$ $V_{GS}=10\text{V}$		15	20	$\text{m}\Omega$
				10	12	
Forward transconductance	g_{fs}	$I_D=22.5\text{A}$ $V_{DS}=25\text{V}$	15	35		S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$		2900	4350	pF
Output capacitance	C_{oss}	$V_{GS}=0\text{V}$		930	1400	
Reverse transfer capacitance	C_{rss}	$f=1\text{MHz}$		260	390	
Turn-on time	$t_{d(on)}$	$V_{CC}=30\text{V}$ $R_G=10\Omega$ $I_D=45\text{A}$		13	30	ns
	t_r			35	50	
Turn-off time	$t_{d(off)}$	$V_{GS}=10\text{V}$		190	290	
	t_f			75	140	
Avalanche capability	I_{AV}	$L=100\mu\text{H}$ $T_{ch}=25^\circ\text{C}$	45			A
Diode forward on-voltage	V_{SD}	$I_F=45\text{A}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$		0.95	1.43	V
Reverse recovery time	t_{rr}	$I_F=45\text{A}$ $V_{GS}=0\text{V}$		55		ns
Reverse recovery charge	Q_{rr}	$-di/dt=100\text{A}/\mu\text{s}$ $T_{ch}=25^\circ\text{C}$		0.10		μC

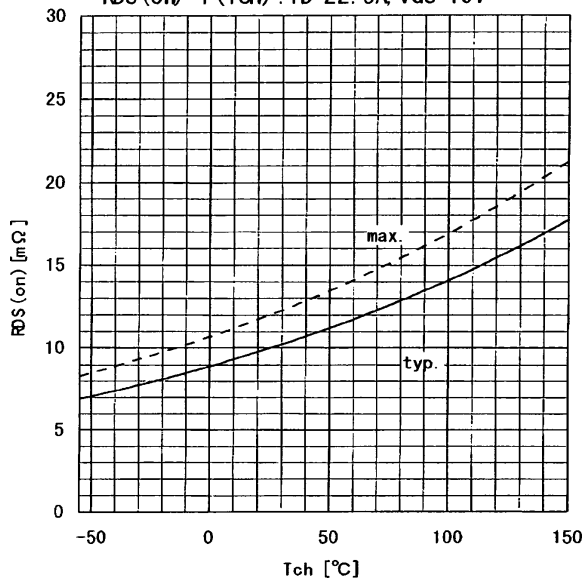
● Thermal characteristics

Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-c)}$			2.08	$^\circ\text{C}/\text{W}$
	$R_{th(ch-a)}$			125.0	$^\circ\text{C}/\text{W}$

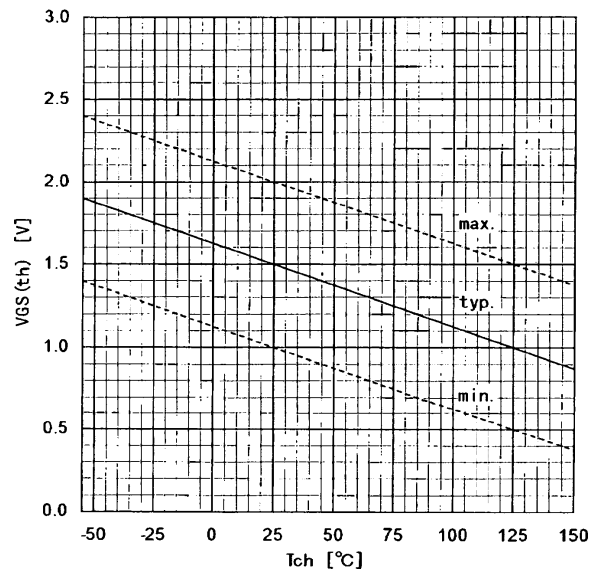
Characteristics



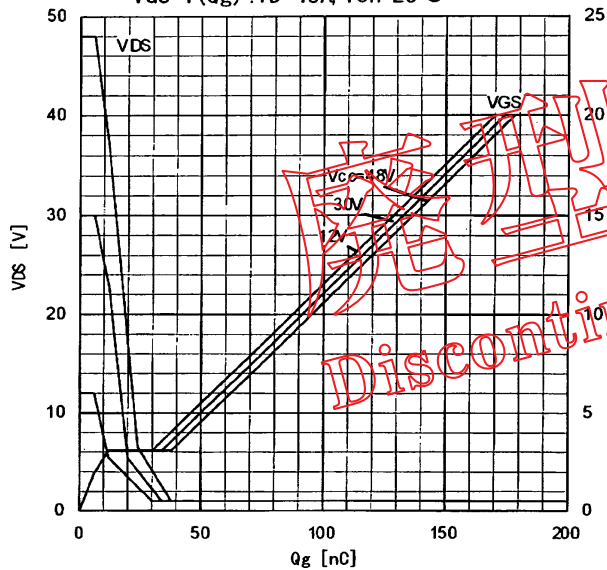
Drain-source on-state resistance
 $R_{DS(on)} = f(T_{ch}) : I_D = 22.5A, V_{GS} = 10V$



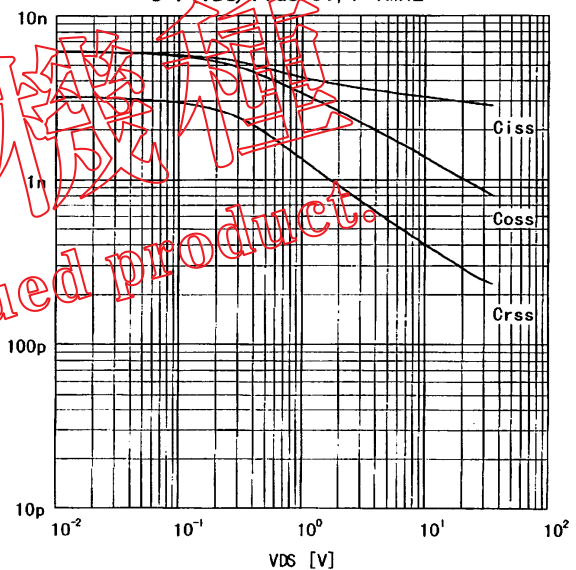
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)} = f(T_{ch}) : V_{DS} = V_{GS}, I_D = 1mA$



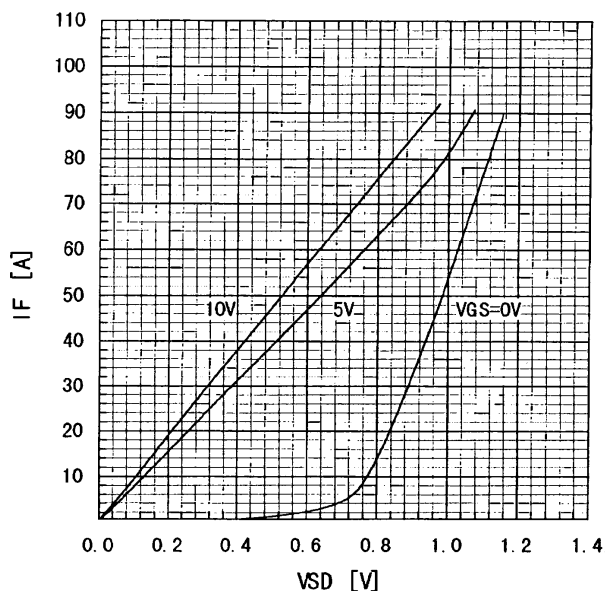
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g) : I_D = 45A, T_{ch} = 25^{\circ}C$



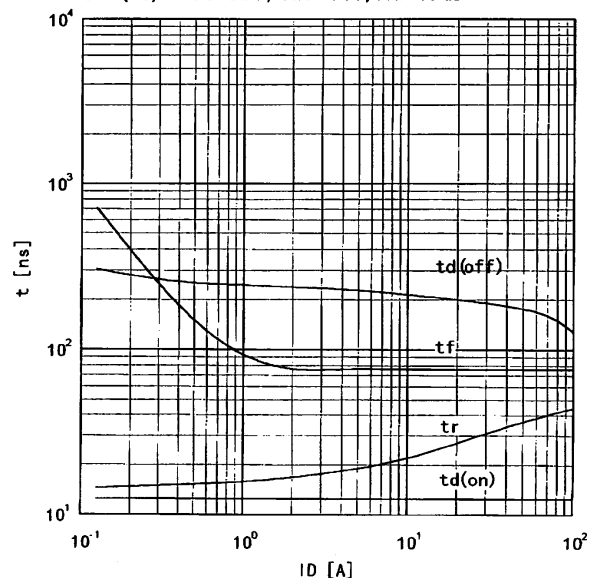
Typical capacitances
 $C = f(V_{DS}) : V_{GS} = 0V, f = 1MHz$



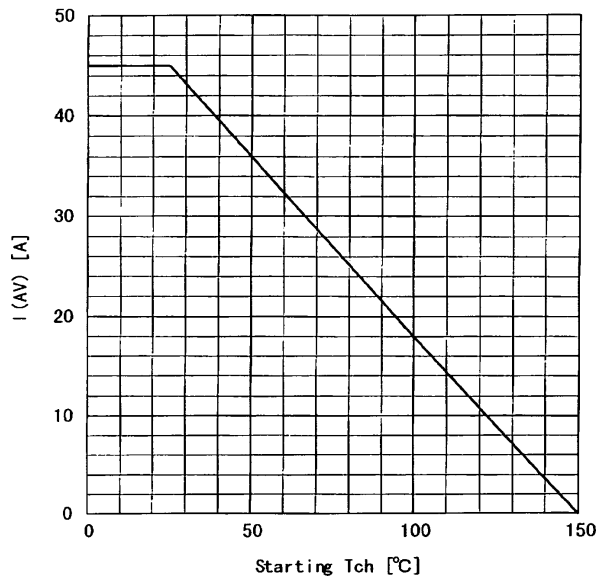
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD}) : 80\mu s \text{ pulse test}, T_{ch} = 25^{\circ}C$



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



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



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

