

N-CHANNEL SILICON POWER MOSFET

FAP-III B SERIES

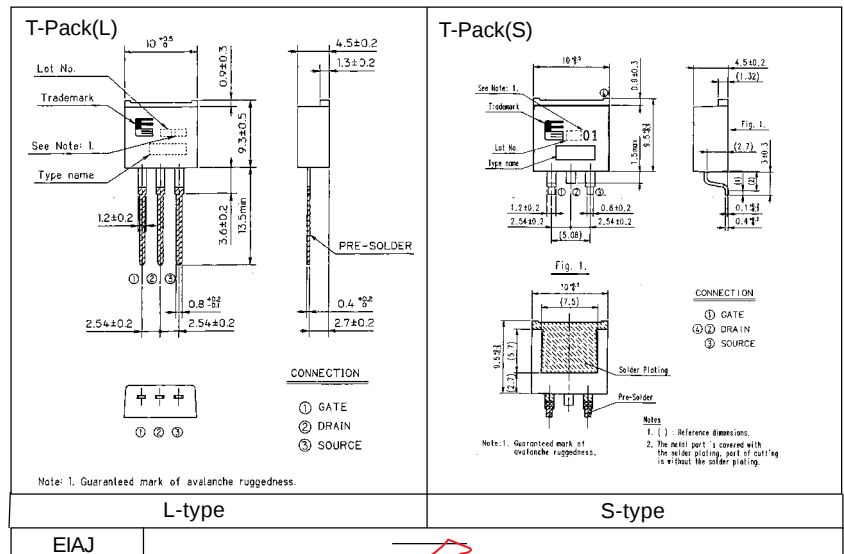
■ Features

- 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



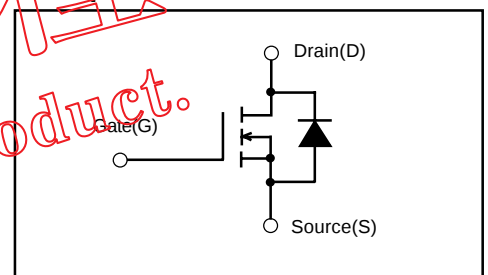
■ Maximum ratings and characteristics

● 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}	−55 to +150	$^\circ\text{C}$	

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

■ Equivalent circuit schematic

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

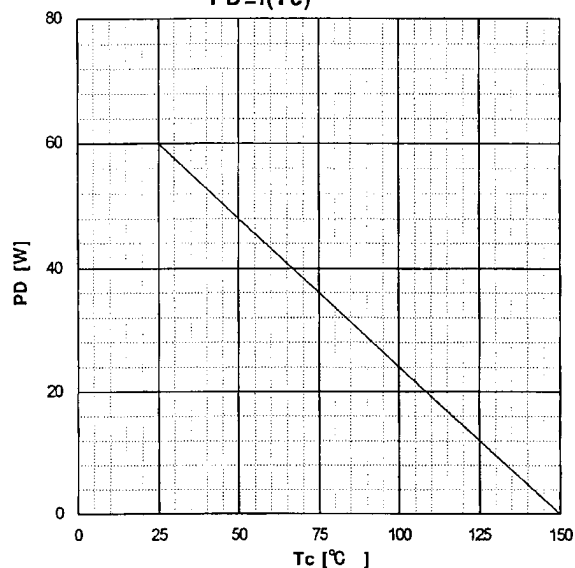
Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=1\text{mA}$ $V_{GS}=0V$	30			V
Gate threshold voltage	$V_{GS(th)}$	$I_D=1\text{mA}$ $V_{DS}=V_{GS}$	1.0	1.5	2.0	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V$ $V_{GS}=0V$		10	500	μA
				0.2	1.0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

● Thermal characteristics

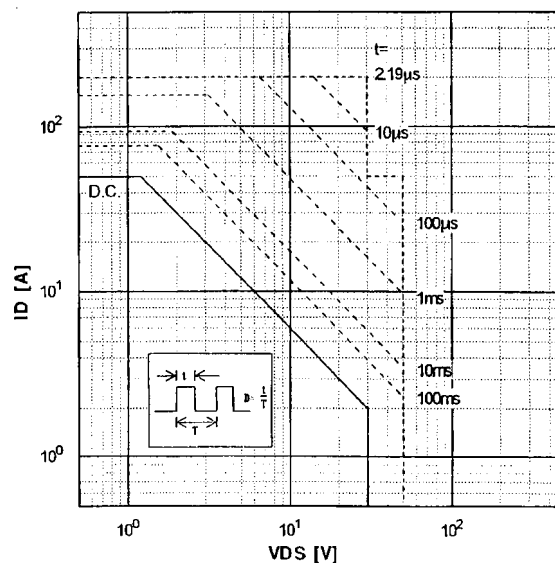
Item	Symbol	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-c)}$			2.08	$^\circ\text{C/W}$
	$R_{th(ch-a)}$			125.0	$^\circ\text{C/W}$

Characteristics

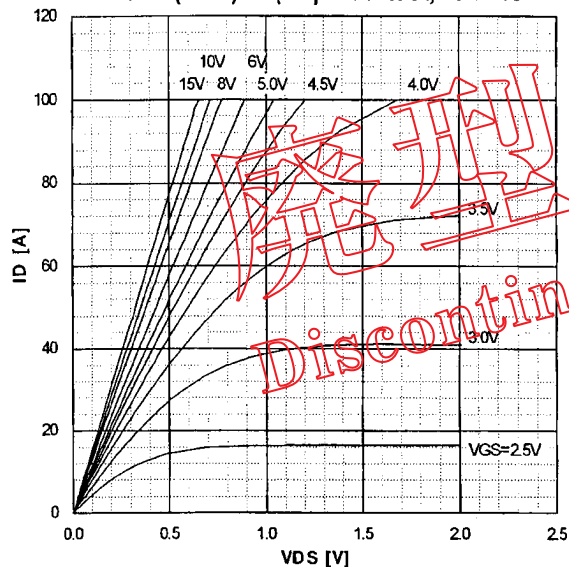
Power Dissipation
 $PD=f(T_c)$



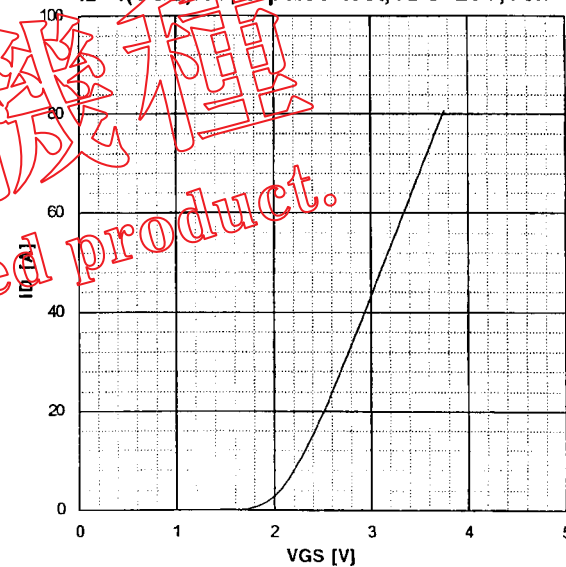
Safe operating area
 $ID=f(V_{DS}): D=0.01, T_c=25^\circ C$



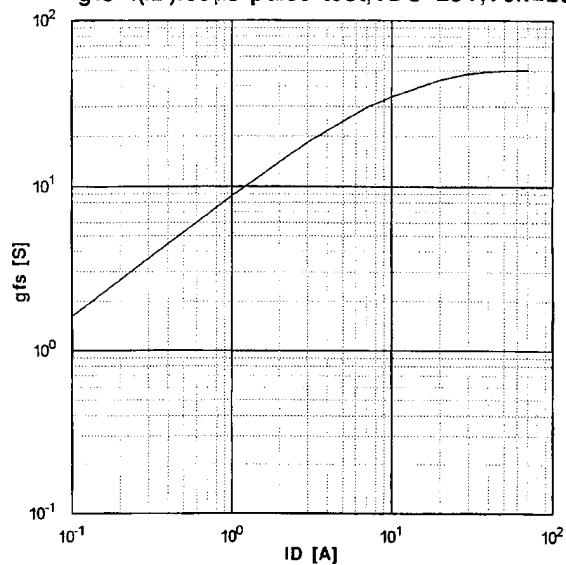
Typical Output Characteristics
 $ID=f(V_{DS}): 80\mu s$ pulse test, $T_{ch}=25^\circ C$



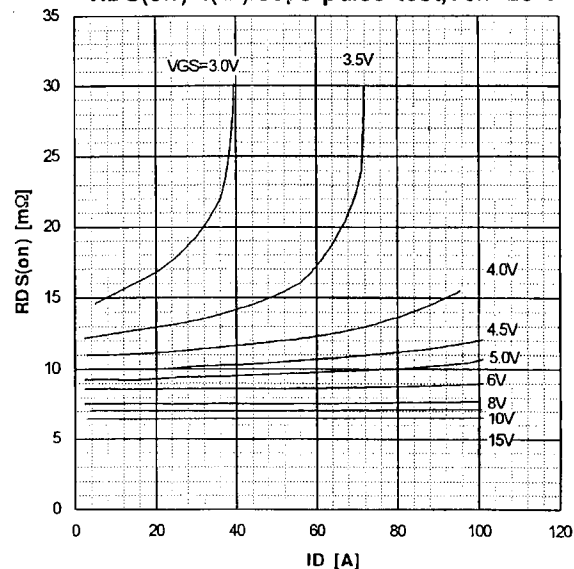
Typical Transfer Characteristic
 $ID=f(V_{GS}): 80\mu s$ pulse test, $V_{DS}=25V, T_{ch}=25^\circ C$



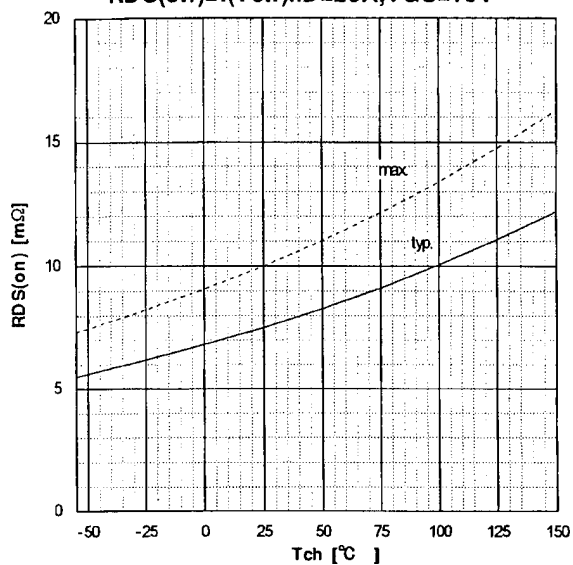
Typical Transconductance
 $g_{fs}=f(ID): 80\mu s$ pulse test, $V_{DS}=25V, T_{ch}=25^\circ C$



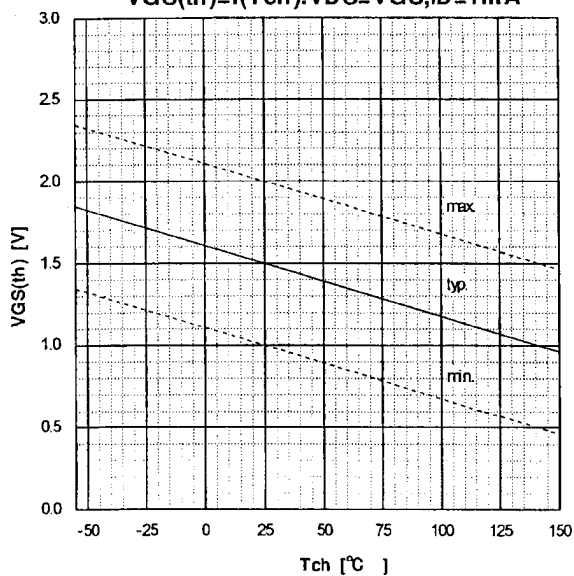
Typical Drain-Source on-state Resistance
 $R_{DS(on)}=f(ID): 80\mu s$ pulse test, $T_{ch}=25^\circ C$



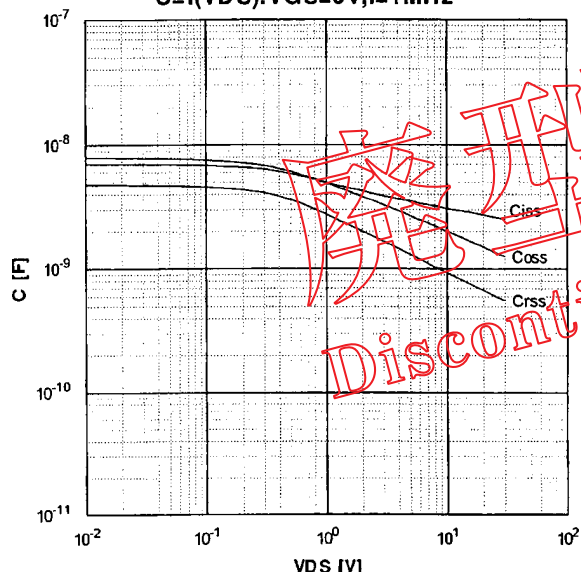
Drain-Source On-state Resistance
 $R_{DS(on)} = f(T_{ch})$; $I_D = 25A, V_{GS} = 10V$



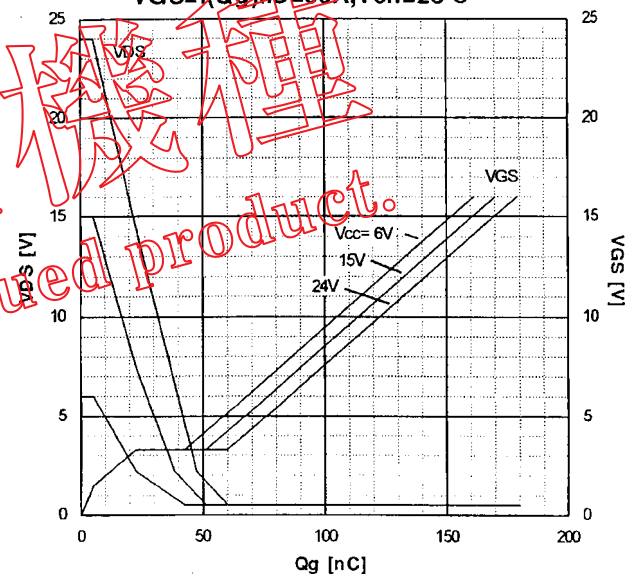
Gate Threshold Voltage
 $V_{GS(th)} = f(T_{ch})$; $V_{DS} = V_{GS}, I_D = 1mA$



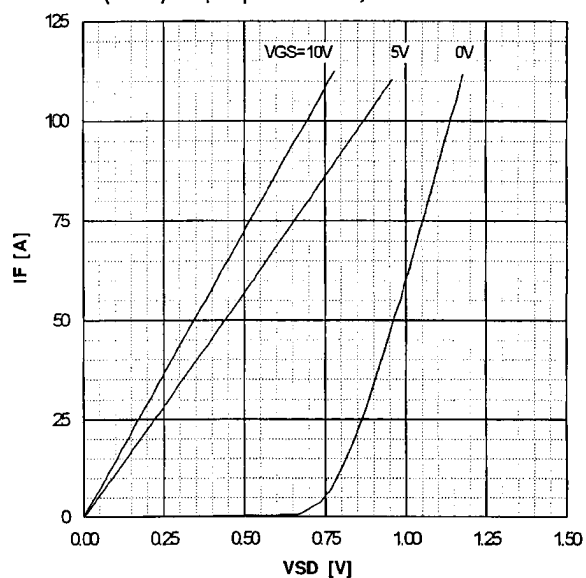
Typical Capacitance
 $C = f(V_{DS})$; $V_{GS} = 0V, f = 1MHz$



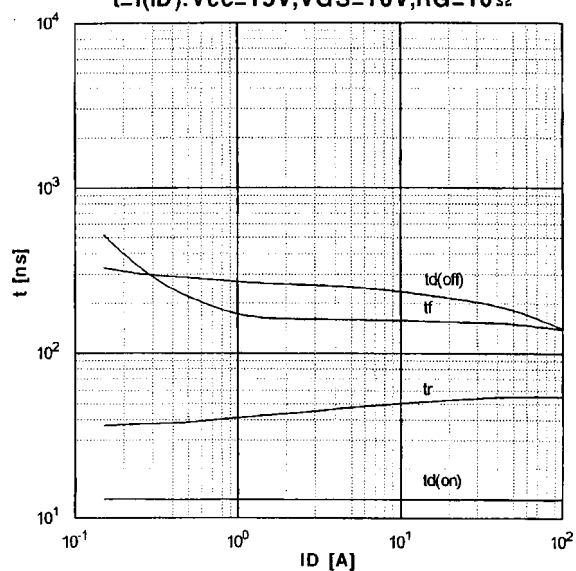
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g)$; $I_D = 50A, T_{ch} = 25°C$



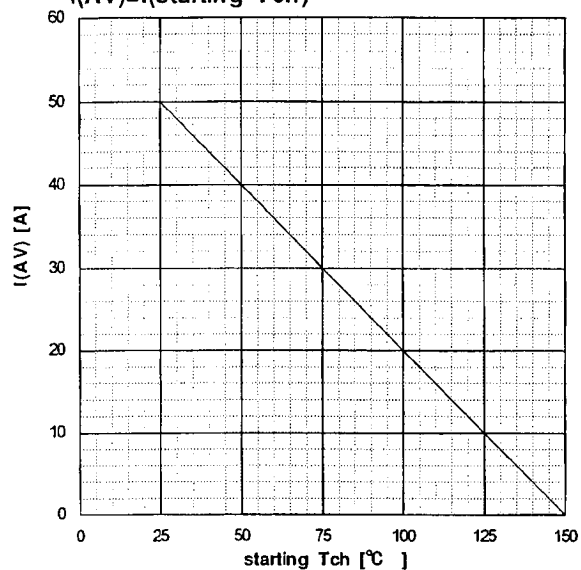
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD})$; 80μs pulse test, $T_{ch} = 25°C$



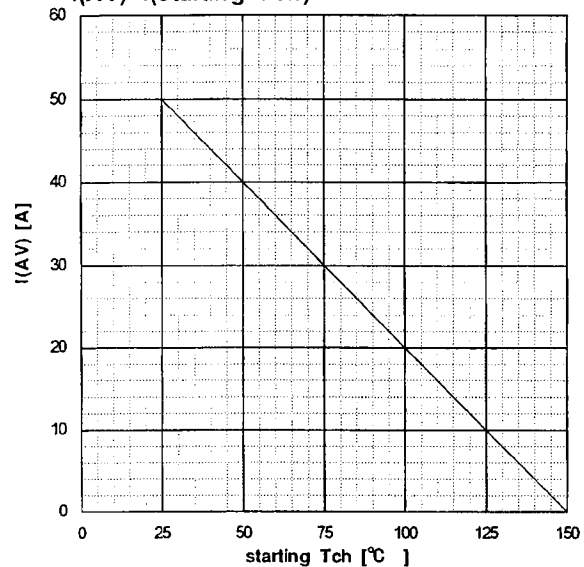
Typical Switching Characteristics vs. I_D
 $t = f(I_D)$; $V_{CC} = 15V, V_{GS} = 10V, R_G = 10Ω$



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: $D=t/T$

