

N-CHANNEL SILICON POWER MOS-FET

FAP-III A SERIES

■ Features

- High current
- Low on-resistance
- No secondary breakdown
- Low driving power
- High forward Transconductance
- Avalanche-proof
- Including G-S Zenner diode

■ Applications

- Motor controllers
- General purpose power amplifier
- DC-DC converters

■ Max. Ratings and Characteristics

- Absolute Maximum Ratings($T_c=25^\circ\text{C}$)
(unless otherwise specified)

Items	Symbols	Ratings	Units
Drain-source voltage	V_{DS}	60	V
Drain-gate voltage($R_{GS}=20\text{K}\Omega$)	V_{DGR}	60	V
Continuous drain current	I_D	40	A
Pulsed drain current	$I_{D(puls)}$	160	A
Gate-source voltage	V_{GS}	± 20	V
Max. power dissipation	P_D	80	W
Operating and storage temperature range	T_{ch} T_{stg}	150 $-55 \sim +150$	$^\circ\text{C}$ $^\circ\text{C}$

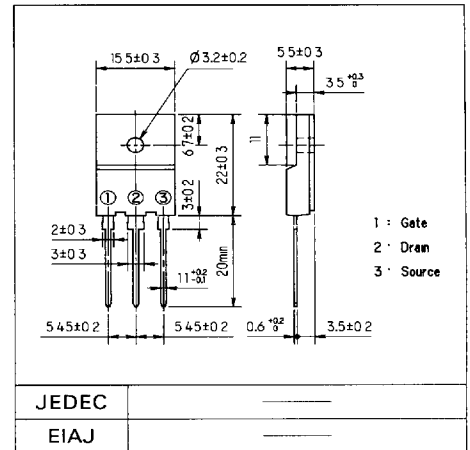
- Electrical Characteristics($T_c=25^\circ\text{C}$) (unless otherwise specified)

Items	Symbols	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}	$V_{DS}=60\text{V}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$			500	μA
		$T_{ch}=125^\circ\text{C}$			1.0	mA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 16\text{V}$ $V_{DS}=0\text{V}$			10.0	μA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=20\text{A}$ $V_{GS}=4\text{V}$		0.030	0.050	Ω
		$V_{GS}=10\text{V}$		0.20	0.030	Ω
Forward transconductance	g_{fs}	$I_D=20\text{A}$ $V_{DS}=25\text{V}$	13.0	25.0		S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$		1600	2400	pF
Output capacitance	C_{oss}	$V_{GS}=0\text{V}$		580	870	
Reverse transfer capacitance	C_{rss}	$f=1\text{MHz}$		320	480	ns
Turn-on time t_{on} ($t_{on}=t_{d(on)}+t_r$)	$t_{d(on)}$	$V_{CC}=30\text{V}$ $I_D=40\text{A}$ $V_{GS}=10\text{V}$ $R_{GS}=25\Omega$		15	23	
Turn-off time t_{off} ($t_{off}=t_{d(off)}+t_f$)	t_r			90	140	
	$t_{d(off)}$			300	450	
	t_f			190	290	
Avalanche capability	I_{AV}	$L=100\mu\text{H}$ $T_{ch}=25^\circ\text{C}$	40.0			A
Continuous reverse drain current	I_{DR}				40.0	A
Pulsed reverse drain current	I_{DRM}				160.0	A
Diode forward on-voltage	V_{SD}	$I_F=2 \times I_{DR}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$		1.40		V
Reverse recovery time	t_{rr}	$I_F=I_{DR}$ $V_{GS}=0\text{V}$		80.0		ns
Reverse recovery charge	Q_{rr}	$-dI_F/dt=100\text{A}/\mu\text{s}$ $T_{ch}=25^\circ\text{C}$		0.17		μC

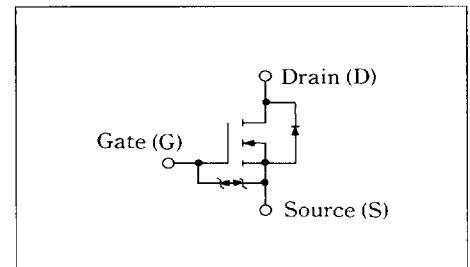
● Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal resistance	$R_{th(ch-a)}$	channel to air			30.0	$^\circ\text{C}/\text{W}$
	$R_{th(ch-c)}$	channel to case			1.56	$^\circ\text{C}/\text{W}$

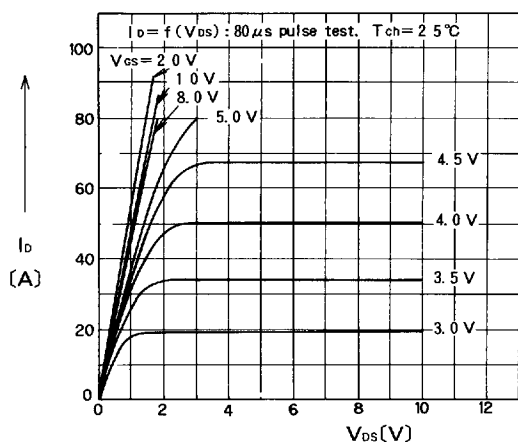
■ Outline Drawings



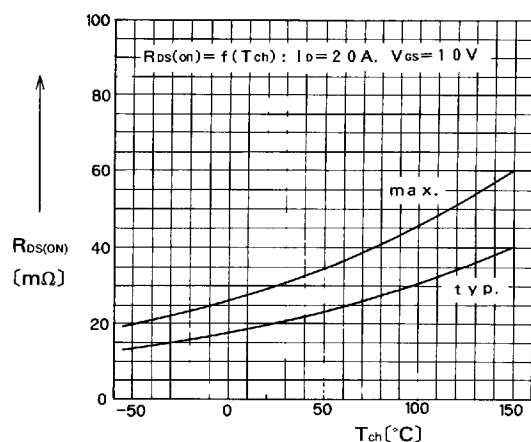
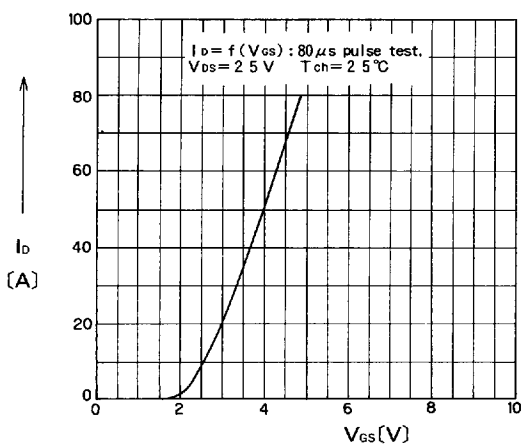
■ Equivalent Circuit Schematic



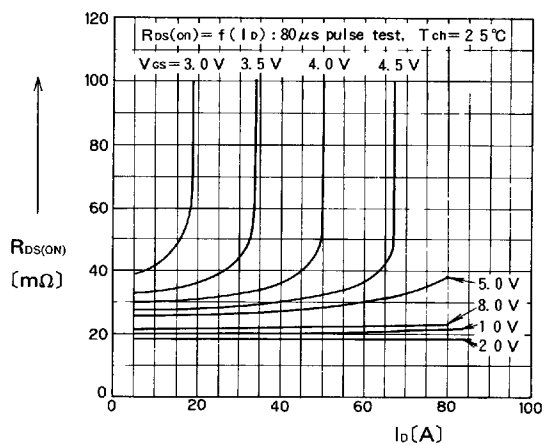
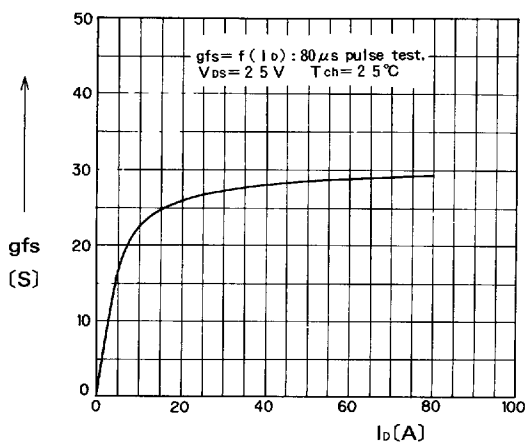
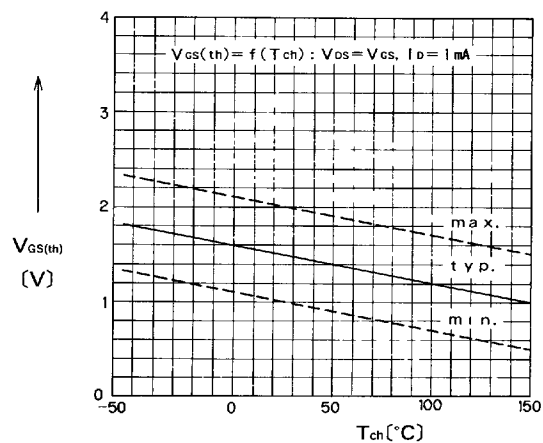
Characteristics

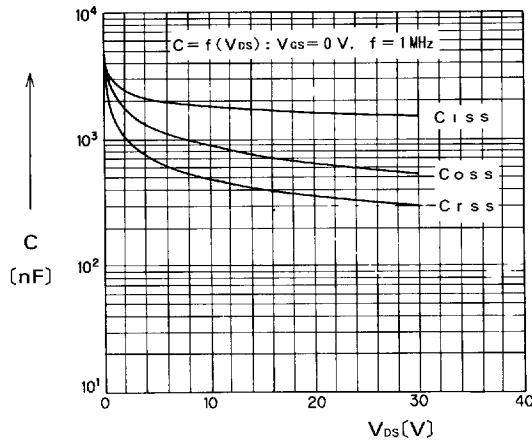


Typical Output Characteristics

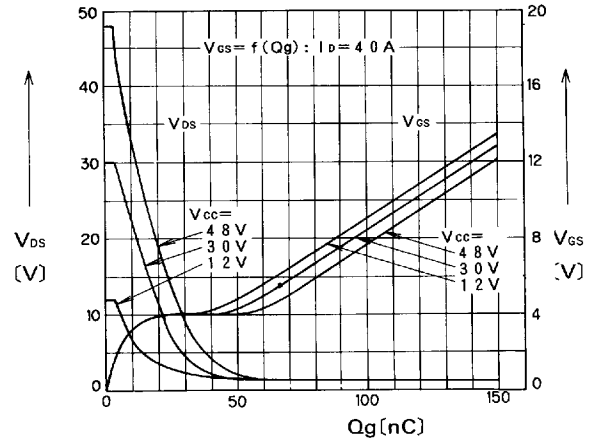
Drain-Source on-State Resistance vs. T_{ch} 

Typical Transfer Characteristics

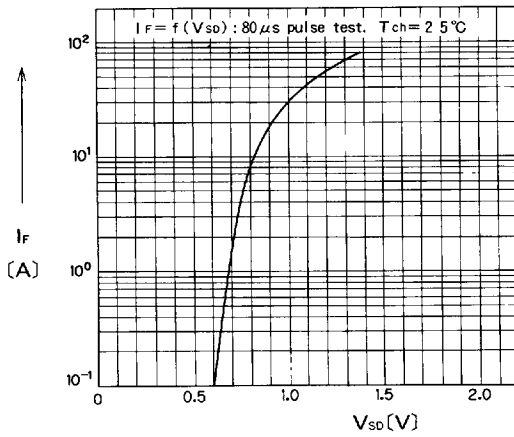
Typical Drain-Source on-State Resistance vs. I_D Typical Forward Transconductance vs. I_D Gate Threshold Voltage vs. T_{ch}



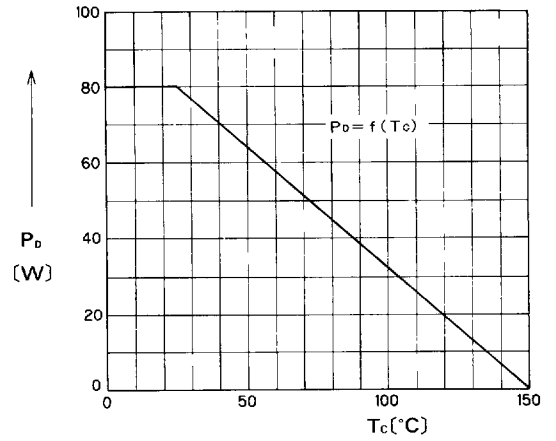
Typical Capacitance vs. V_{DS}



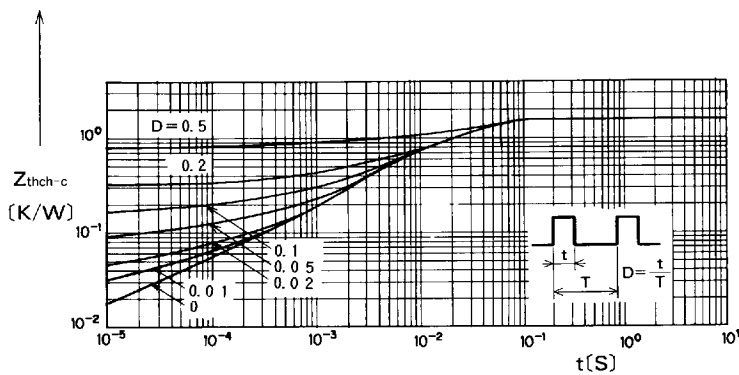
Typical Input Charge



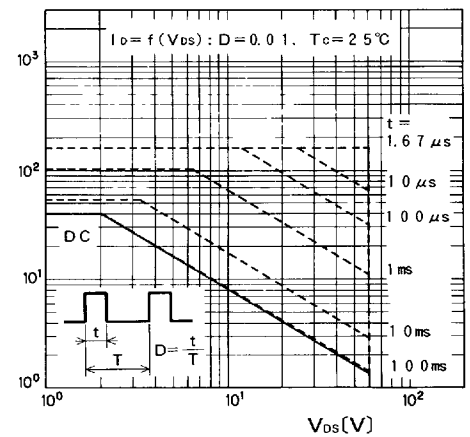
Forward Characteristics of Reverse Diode



Allowable Power Dissipation vs. T_c



Transient Thermal Impedance



Safe Operating Area