

## N-CHANNEL SILICON POWER MOSFET

## FAP-III SERIES

### Features

- High current
- Low on-resistance
- No secondary breakdown
- Low driving power
- High forward Transconductance
- Avalanche-proof

### Applications

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

### Maximum ratings and characteristics

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

Item	Symbol	Rating	Unit
Drain-source voltage	V <sub>DS</sub>	150	V
Continuous drain current	I <sub>D</sub>	20	A
Pulsed drain current	I <sub>D(puls)</sub>	80	A
Continuous reverse drain current	I <sub>DR</sub>	20	A
Gate-source peak voltage	V <sub>GS</sub>	±20	V
Max. power dissipation	P <sub>D</sub>	50	W
Operating and storage temperature range	T <sub>ch</sub>	+150	°C
	T <sub>stg</sub>	-55 to +150	°C

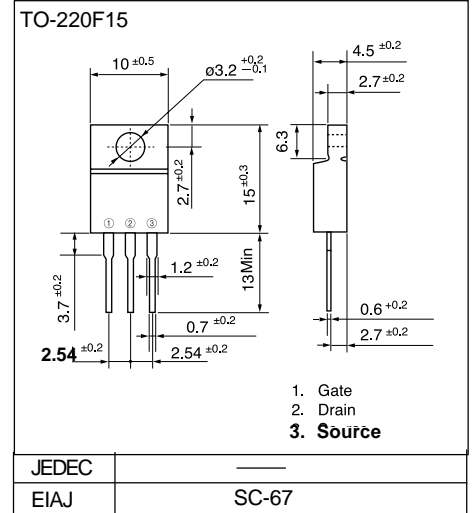
#### Electrical characteristics (Tc =25°C unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =1mA V <sub>GS</sub> =0V	150			V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =1mA V <sub>DS</sub> =V <sub>GS</sub>	1.0	1.5	2.5	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =150V V <sub>GS</sub> =0V	T <sub>ch</sub> =25°C	10	500	μA
			T <sub>ch</sub> =125°C	0.2	1.0	mA
Gate-source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V V <sub>DS</sub> =0V		10	100	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =10A	V <sub>GS</sub> =4V	0.065	0.100	Ω
			V <sub>GS</sub> =10V	0.055	0.080	
Forward transconductance	g <sub>fs</sub>	I <sub>D</sub> =10A V <sub>DS</sub> =25V	10	20		S
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V V <sub>GS</sub> =0V f=1MHz		2300	3450	pF
Output capacitance	C <sub>oss</sub>			330	500	
Reverse transfer capacitance	C <sub>rss</sub>			150	230	
Turn-on time t <sub>on</sub> (t <sub>on</sub> =t <sub>d(on)</sub> +t <sub>r</sub> )	t <sub>d(on)</sub>	V <sub>CC</sub> =30V R <sub>G</sub> =25 Ω I <sub>D</sub> =20A		15	25	ns
	t <sub>r</sub>			20	30	
Turn-off time t <sub>off</sub> (t <sub>off</sub> =t <sub>d(off)</sub> +t <sub>f</sub> )	t <sub>d(off)</sub>	V <sub>GS</sub> =10V		450	700	
	t <sub>f</sub>			100	150	
Avalanche capability	I <sub>AV</sub>	L=100μH T <sub>ch</sub> =25°C	20			A
Diode forward on-voltage	V <sub>SD</sub>	I <sub>F</sub> =2xI <sub>DR</sub> V <sub>GS</sub> =0V T <sub>ch</sub> =25°C		1.00	1.50	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =I <sub>DR</sub> V <sub>GS</sub> =0V		125		ns
Reverse recovery charge	Q <sub>rr</sub>	-di/dt=100A/μs T <sub>ch</sub> =25°C		0.6		μC

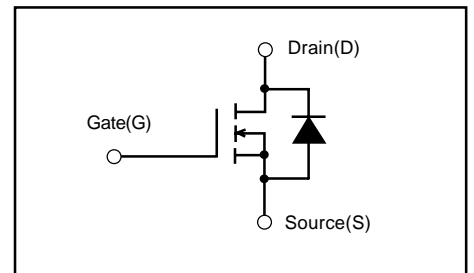
### Thermal characteristics

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal resistance	R <sub>th(ch-a)</sub>	channel to ambient			62.5	°C/W
	R <sub>th(ch-c)</sub>	channel to case			2.5	°C/W

### Outline Drawings

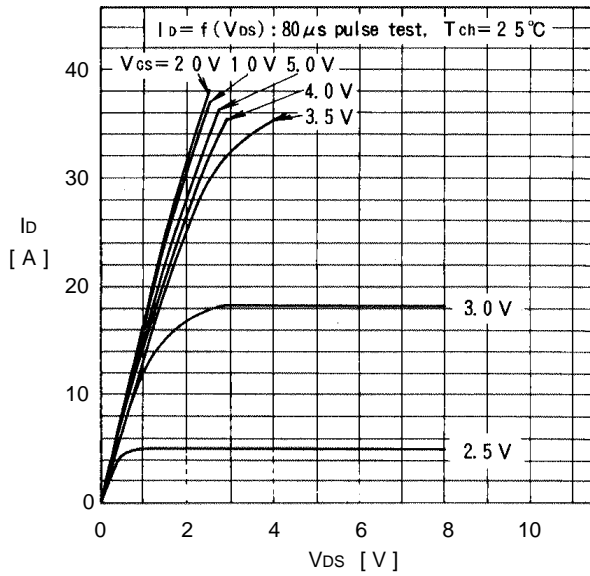


### Equivalent circuit schematic

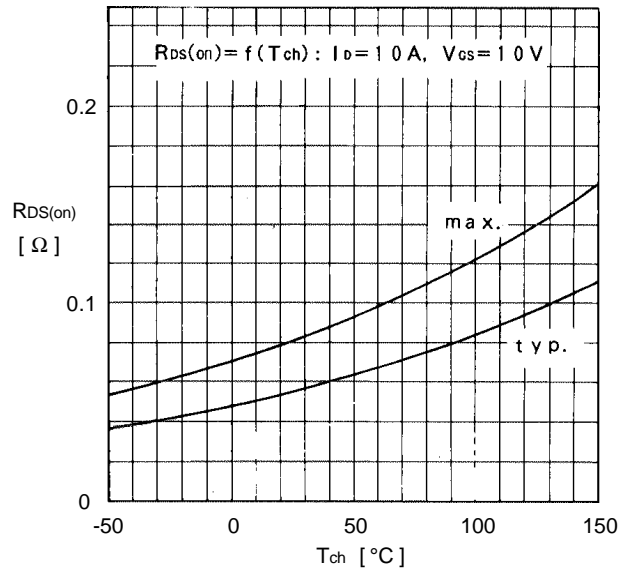


Characteristics

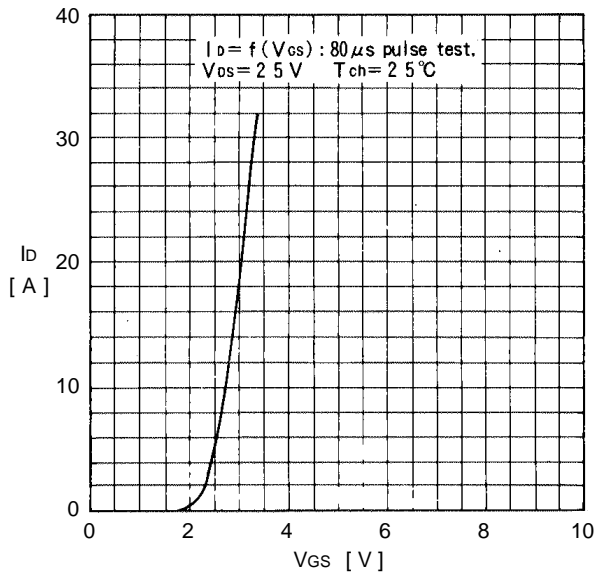
Typical output characteristics



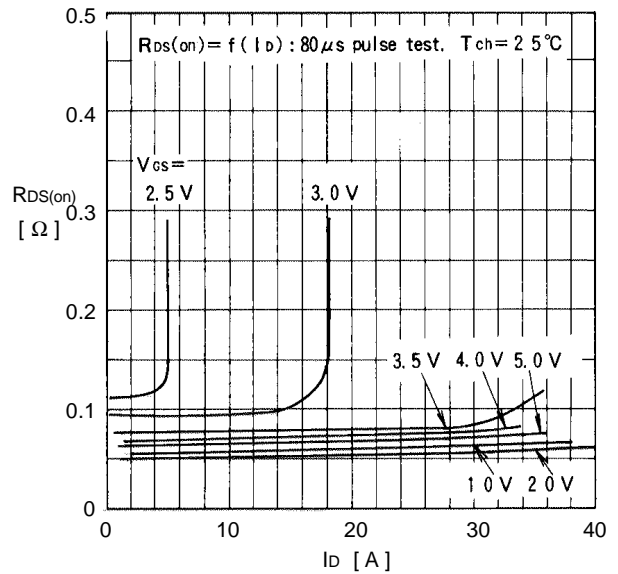
On state resistance vs.  $T_{ch}$



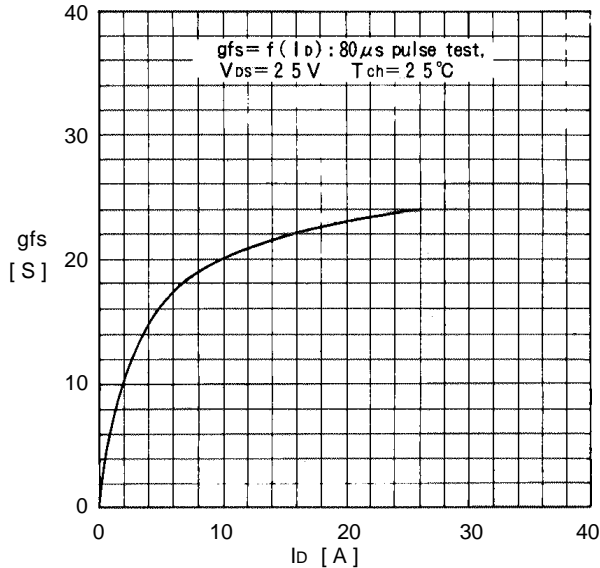
Typical transfer characteristics



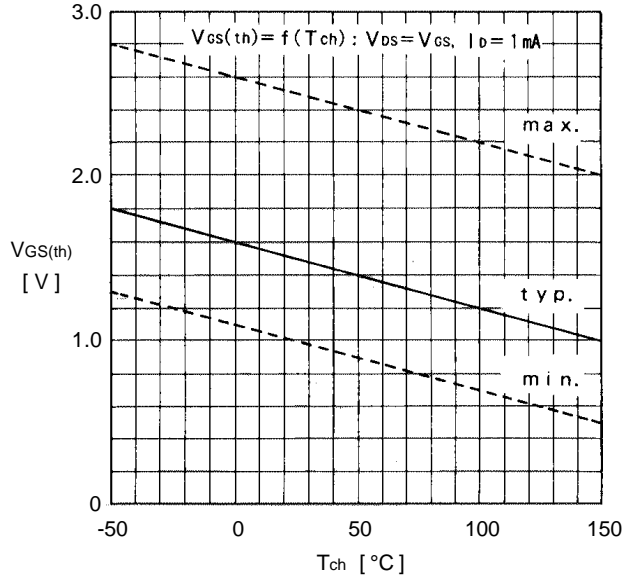
Typical Drain-Source on state resistance vs.  $I_D$



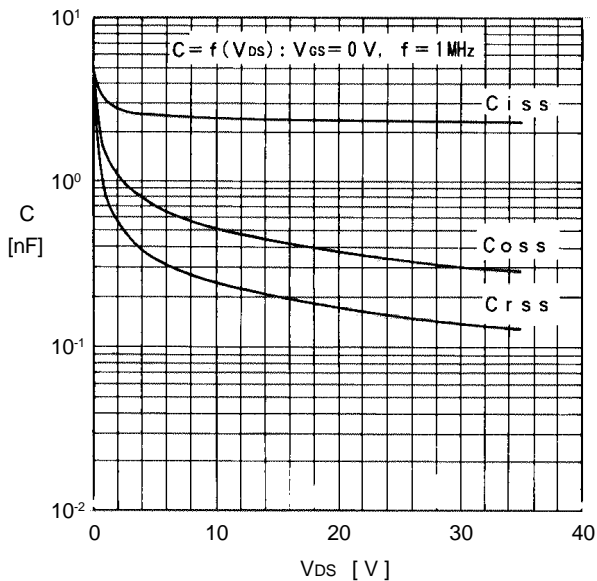
Typical forward transconductance vs.  $I_D$



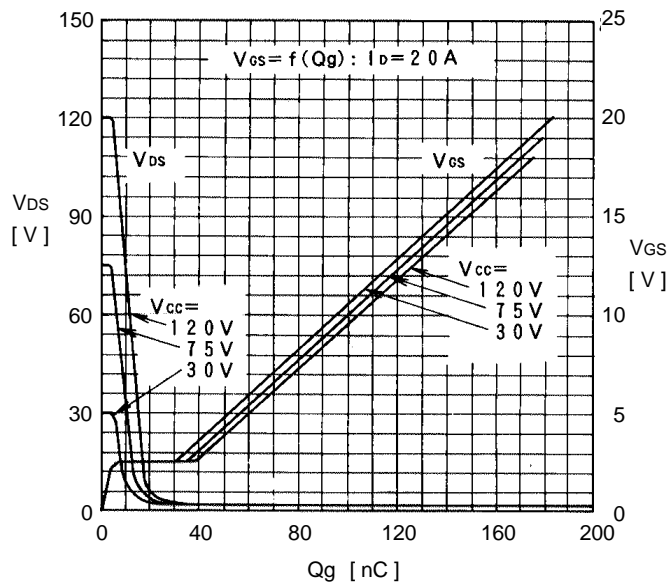
Gate threshold voltage vs.  $T_{ch}$



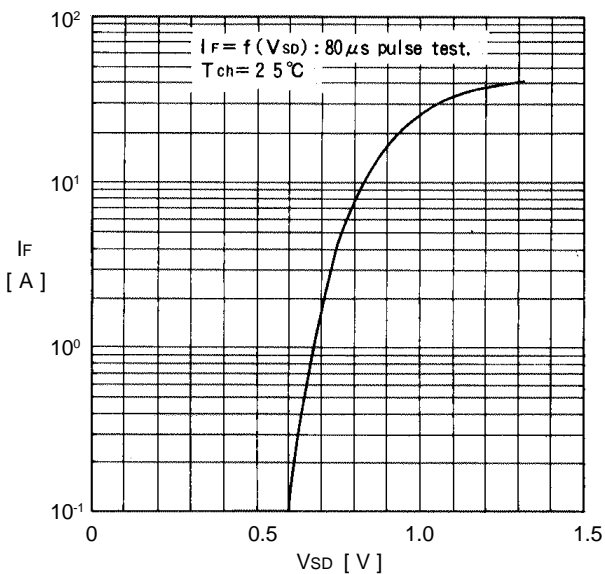
Typical capacitance vs.  $V_{DS}$



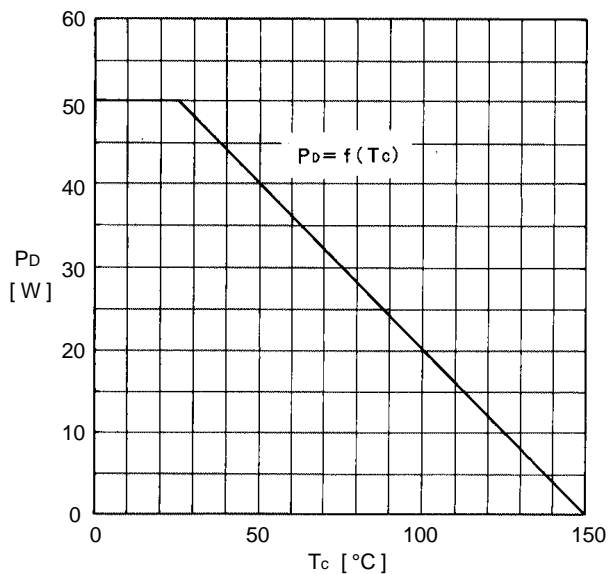
Typical input charge



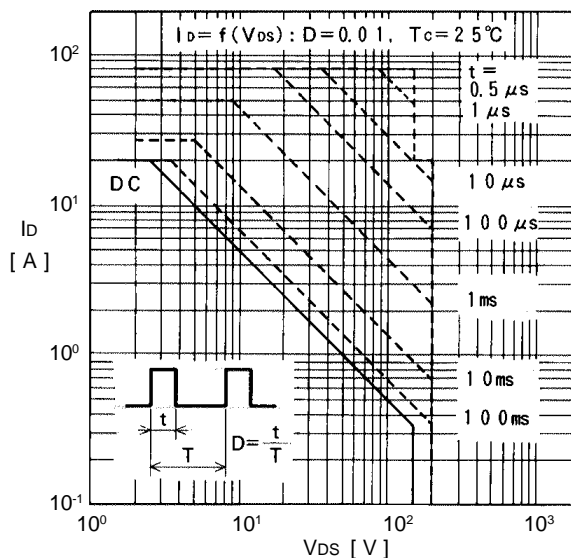
Forward characteristics of reverse diode



Allowable power dissipation vs.  $T_c$



Safe operating area



Transient thermal impedance

