

# FMV16N50ES

FUJI POWER MOSFET

## Super FAP-E<sup>3S</sup> series

N-CHANNEL SILICON POWER MOSFET

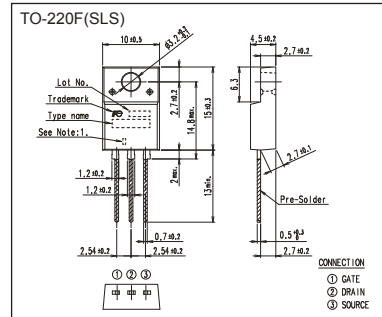
### ■ Features

- Maintains both low power loss and low noise
- Lower R<sub>DS(on)</sub> characteristic
- More controllable switching dv/dt by gate resistance
- Smaller V<sub>GS</sub> ringing waveform during switching
- Narrow band of the gate threshold voltage (4.2±0.5V)
- High avalanche durability

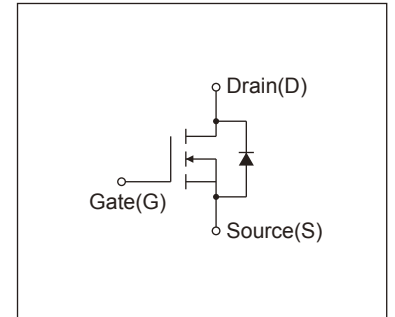
### ■ Applications

- Switching regulators
- UPS (Uninterruptible Power Supply)
- DC-DC converters

### ■ Outline Drawings [mm]



### ■ Equivalent circuit schematic



### ■ Maximum Ratings and Characteristics

#### ● Absolute Maximum Ratings at T<sub>c</sub>=25°C (unless otherwise specified)

Description	Symbol	Characteristics	Unit	Remarks
Drain-Source Voltage	V <sub>DS</sub>	500	V	
	V <sub>DSSX</sub>	500	V	V <sub>GS</sub> = -30V
Continuous Drain Current	I <sub>D</sub>	±16	A	
Pulsed Drain Current	I <sub>DP</sub>	±64	A	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	I <sub>AR</sub>	16	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E <sub>AS</sub>	485	mJ	Note*2
Repetitive Maximum Avalanche Energy	E <sub>AR</sub>	8	mJ	Note*3
Peak Diode Recovery dv/dt	dv/dt	4.8	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/μs	Note*5
Maximum Power Dissipation	P <sub>D</sub>	2.16	W	T <sub>a</sub> =25°C
		80		T <sub>c</sub> =25°C
Operating and Storage Temperature range	T <sub>ch</sub>	150	°C	
	T <sub>stg</sub>	-55 to + 150	°C	
Isolation Voltage	V <sub>ISO</sub>	2	kVrms	t = 60sec, f = 60Hz

#### ● Electrical Characteristics at T<sub>c</sub>=25°C (unless otherwise specified)

Description	Symbol	Conditions	min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	500	-	-	V
Gate Threshold Voltage	V <sub>GS</sub> (th)	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	3.7	4.2	4.7	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	25	μA
		V <sub>DS</sub> =400V, V <sub>GS</sub> =0V	-	-	250	
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	10	100	nA
Drain-Source On-State Resistance	R <sub>DS</sub> (on)	I <sub>D</sub> =8A, V <sub>GS</sub> =10V	-	0.33	0.38	Ω
Forward Transconductance	g <sub>fs</sub>	I <sub>D</sub> =8A, V <sub>DS</sub> =25V	5.5	11	-	S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V	-	1700	2550	pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> =0V	-	210	315	
Reverse Transfer Capacitance	C <sub>rss</sub>	f=1MHz	-	13	19.5	
Turn-On Time	td(on)	V <sub>cc</sub> =300V	-	37	55.5	ns
	tr	V <sub>GS</sub> =10V	-	30	45	
Turn-Off Time	td(off)	I <sub>D</sub> =8A	-	87	130.5	ns
	tf	R <sub>GS</sub> =18Ω	-	17	25.5	
Total Gate Charge	Q <sub>G</sub>	V <sub>cc</sub> =250V	-	48	72	nC
Gate-Source Charge	Q <sub>GS</sub>	I <sub>D</sub> =16A	-	17	25.5	
Gate-Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> =10V	-	18	27	
Gate-Drain Crossover Charge	Q <sub>SW</sub>		-	7	10.5	
Avalanche Capability	I <sub>AV</sub>	L=1.52mH, T <sub>ch</sub> =25°C	16	-	-	A
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =16A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°C	-	0.90	1.35	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =16A, V <sub>GS</sub> =0V	-	0.46	-	μs
Reverse Recovery Charge	Q <sub>rr</sub>	-di/dt=100A/μs, T <sub>ch</sub> =25°C	-	6.0	-	μC

#### ● Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	R <sub>th</sub> (ch-c)	Channel to Case			1.560	°C/W
	R <sub>th</sub> (ch-a)	Channel to Ambient			58.0	°C/W

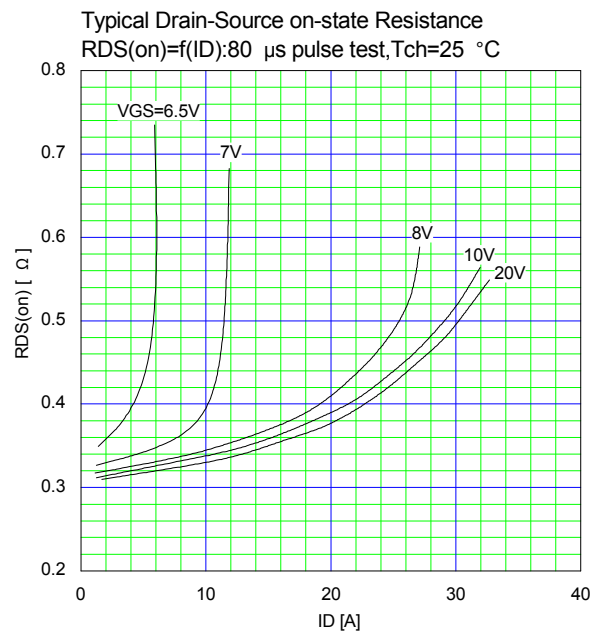
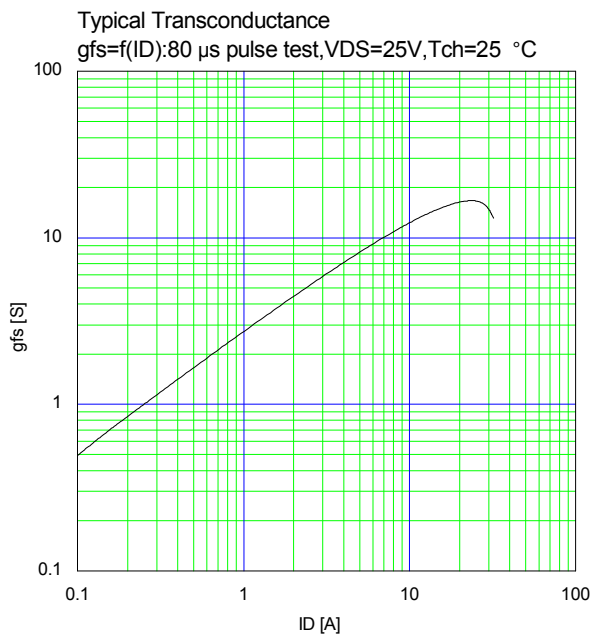
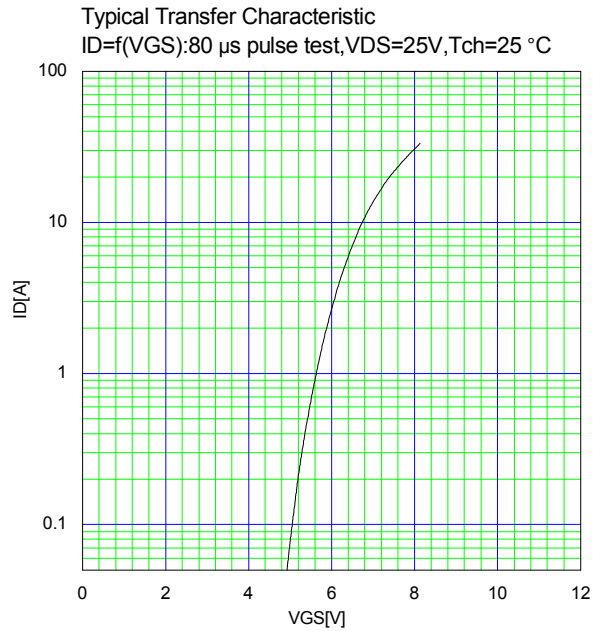
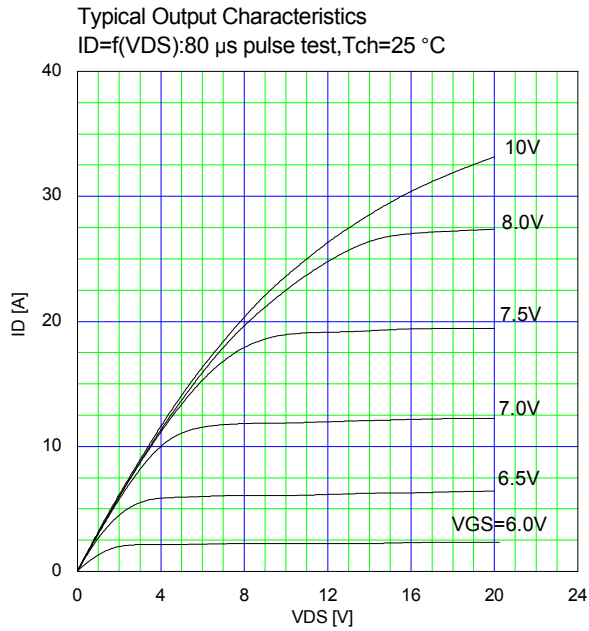
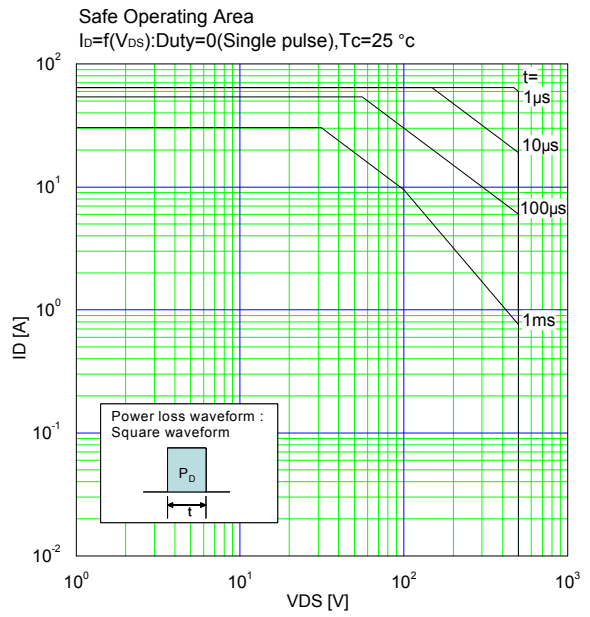
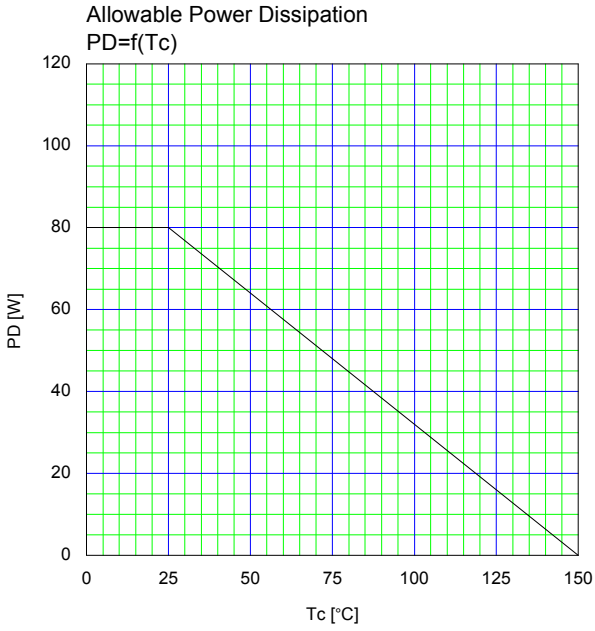
Note \*1 : T<sub>ch</sub>≤150°C.

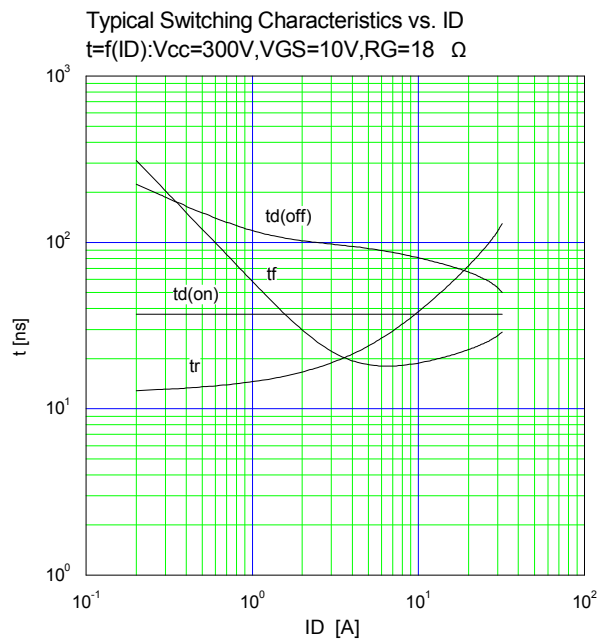
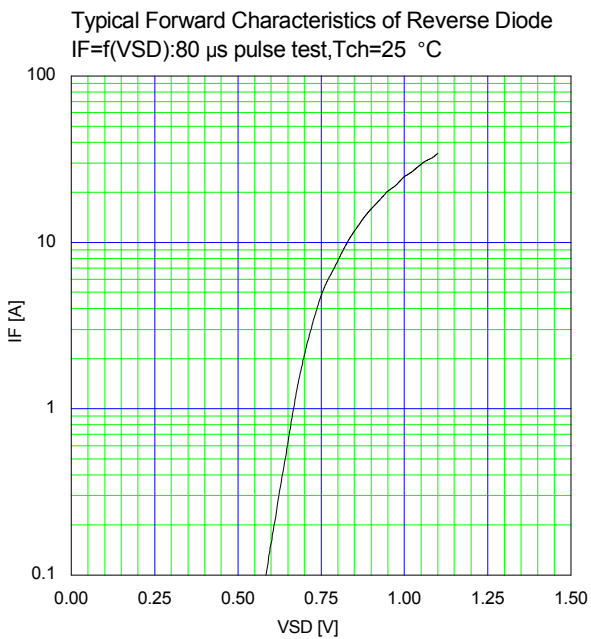
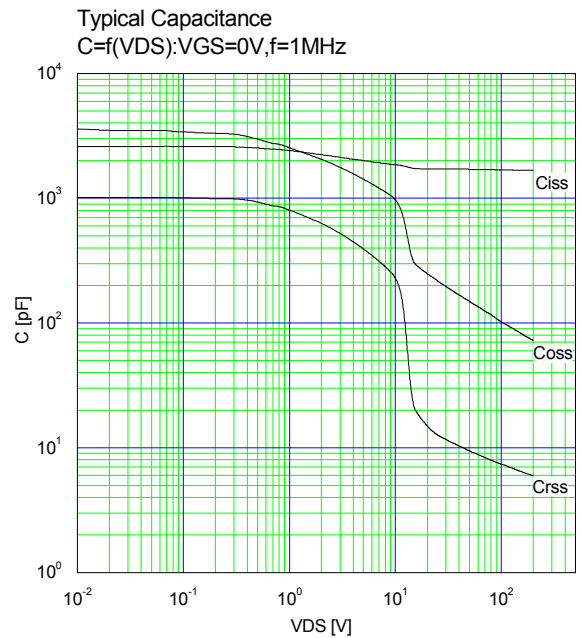
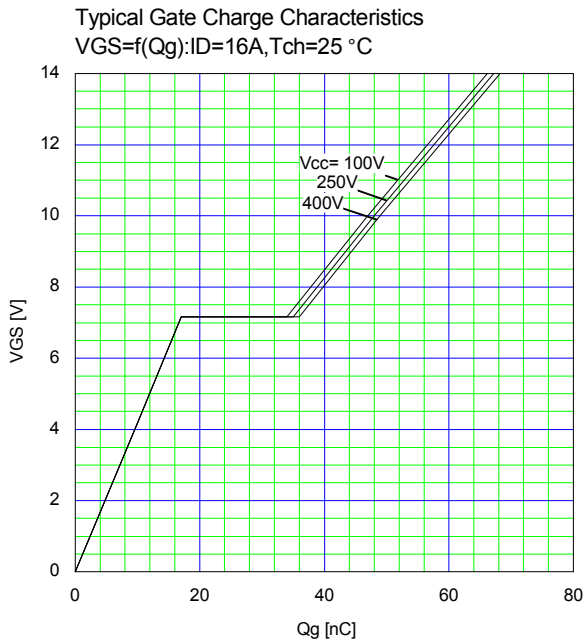
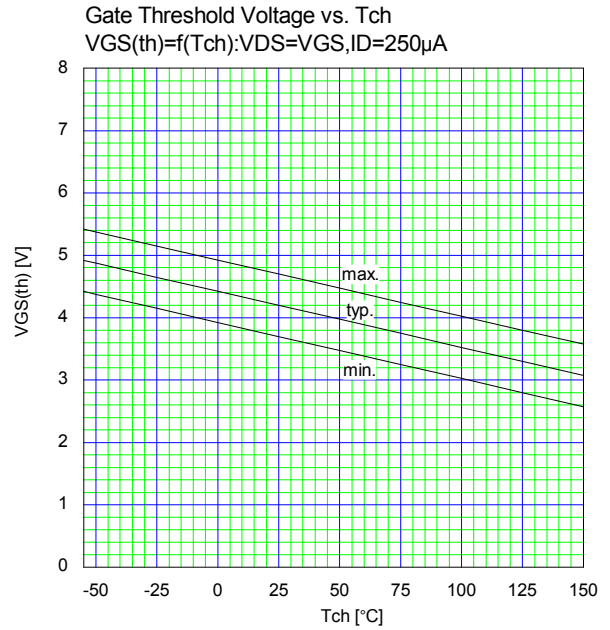
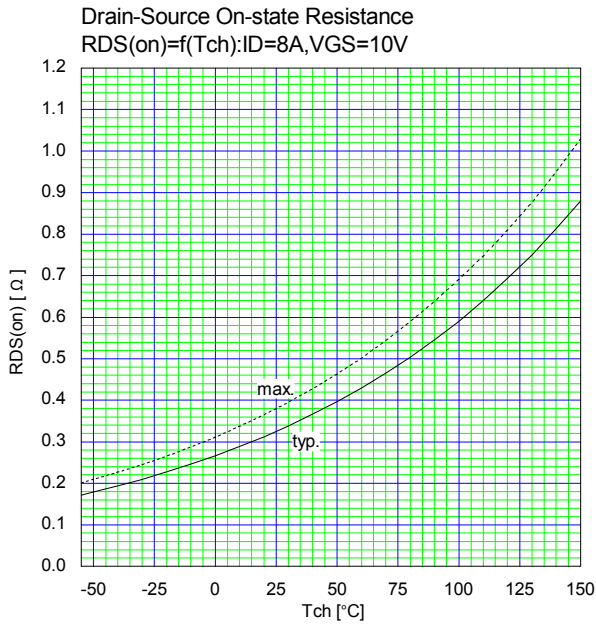
Note \*2 : Stating T<sub>ch</sub>=25°C, I<sub>AS</sub>=7A, L=18.1mH, V<sub>cc</sub>=50V, R<sub>G</sub>=50Ω.  
EAS limited by maximum channel temperature and avalanche current.  
See to 'Avalanche Energy' graph.

Note \*3 : Repetitive rating : Pulse width limited by maximum channel temperature.  
See to the 'Transient Thermal impedance' graph.

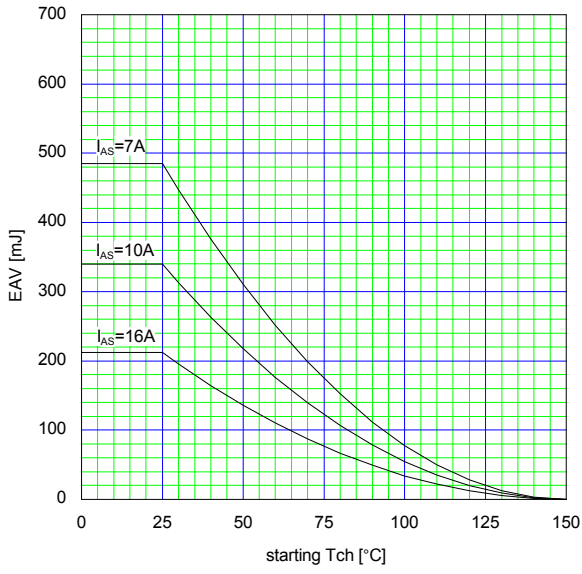
Note \*4 : I<sub>F</sub>≤I<sub>D</sub>, -di/dt=100A/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

Note \*5 : I<sub>F</sub>≤I<sub>D</sub>, dv/dt=4.8kV/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

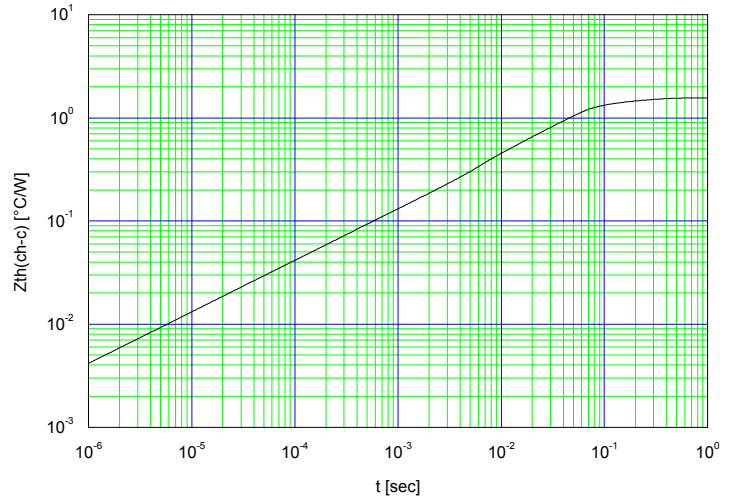




Maximum Avalanche Energy vs. starting Tch  
 $E(AV)=f(\text{starting Tch}):V_{cc}=50V, I(AV)\leq 16A$



Maximum Transient Thermal Impedance  
 $Z_{th}(ch-c)=f(t):D=0$



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