

, e-Front runners

#### **FUJI POWER MOSFET**

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

### **N-CHANNEL SILICON POWER MOSFET**

#### Features

Maintains both low power loss and low noise Lower R<sub>DS</sub>(on) characteristic More controllable switching dv/dt by gate resistance

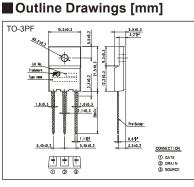
Smaller V<sub>GS</sub> ringing waveform during switching Narrow band of the gate threshold voltage  $(3.0\pm0.5V)$ High avalanche durability

#### Applications

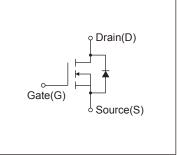
Switching regulators UPS (Uninterruptible Power Supply) **DC-DC converters** 

#### Maximum Ratings and Characteristics

#### • Absolute Maximum Ratings at Tc=25°C (unless otherwise specified)



Equivalent circuit schematic



Description	Symbol	Characteristics	Unit	Remarks
Drain Source Veltere	VDS	600	V	
Drain-Source Voltage	VDSX	600	V	V <sub>GS</sub> = -30V
Continuous Drain Current	lo	±19	A	
Pulsed Drain Current	IDP	±76	А	
Gate-Source Voltage	Vgs	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	lar	19	А	Note*1
Non-Repetitive Maximum Avalanche Energy	EAS	799	mJ	Note*2
Repetitive Maximum Avalanche Energy	Ear	15	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	6.5	kV/µs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5
Manimum Barran Dia sin stilan	PD	3.13	W	Ta=25°C
Maximum Power Dissipation		150	VV	Tc=25°C
On another and Otamana Tananatana anana	Tch	150	°C	
Operating and Storage Temperature range	Tstg	-55 to + 150	°C	
Isolation Voltage	VISO	2	kVrms	t = 60sec, f = 60Hz

#### • Electrical Characteristics at Tc=25°C (unless otherwise specified)

Description	Symbol	Conditions	Conditions		typ.	max.	Unit
Drain-Source Breakdown Voltage	BVDSS	ID=250µA, VGS=0V	ID=250µA, VGS=0V		-	-	V
Gate Threshold Voltage	Vgs (th)	ID=250µA, VDS=VGS		2.5	3.0	3.5	V
Zero Gate Voltage Drain Current		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	Tch=25°C	-	-	25	μA
	IDSS	V <sub>DS</sub> =480V, V <sub>GS</sub> =0V	Tch=125°C	-	-	250	
Gate-Source Leakage Current	Igss	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V		-	10	100	nA
Drain-Source On-State Resistance	RDS (on)	ID=9.5A, VGS=10V		-	0.31	0.365	Ω
Forward Transconductance	<b>g</b> fs	ID=9.5A, VDS=25V		13	26	-	S
Input Capacitance	Ciss	V <sub>DS</sub> =25V V <sub>GS</sub> =0V f=1MHz		-	3600	5400	pF
Output Capacitance	Coss			-	310	465	
Reverse Transfer Capacitance	Crss			-	23	35	
Turn-On Time	td(on)	V <sub>cc</sub> =300V V <sub>GS</sub> =10V I <sub>D</sub> =9.5A R <sub>GS</sub> =8.2Ω		-	26	39	ns
	tr			-	13	20	
Turn-Off Time	td(off)			-	150	225	
	tf			-	20	30	
Total Gate Charge	QG	Vcc=300V	Vcc=300V		105	160	
Gate-Source Charge	Q <sub>GS</sub>	ID=19A Vgs=10V		-	23	35	nC
Gate-Drain Charge	QGD			-	30	45	
Avalanche Capability	lav	L=1.71mH, T <sub>ch</sub> =25°C		19	-	-	A
Diode Forward On-Voltage	Vsd	IF=19A, VGS=0V, Tch=25°C		-	0.90	1.35	V
Reverse Recovery Time	trr	IF=19A, VGS=0V		-	0.6	-	μs
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25°C		-	10	-	μC

#### Thermal Characteristics

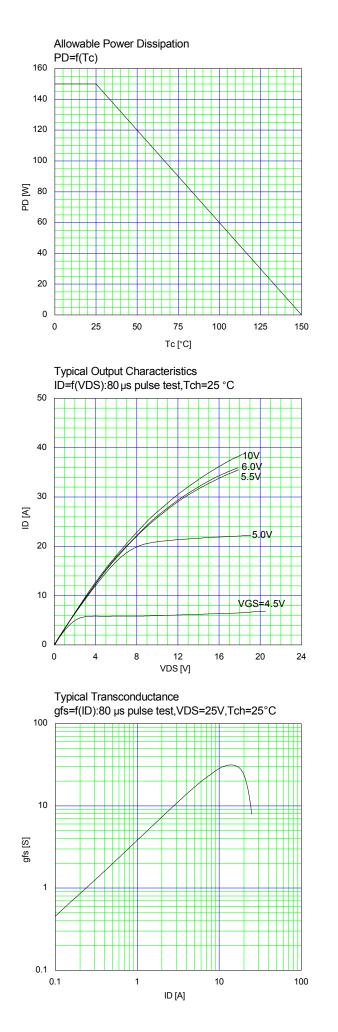
Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to case			0.83	°C/W
	Rth (ch-a)	Channel to ambient			40.0	°C/W

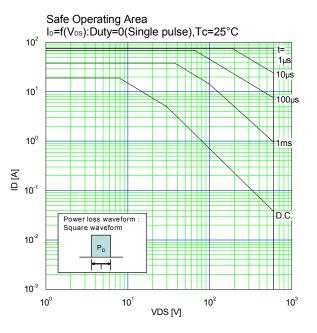
Note \*1 : Tch≤150°C

Note 1 : Italia 50 C, IAs=8A, L=22.9mH, Vcc=60V, R<sub>G</sub>=50Ω EAs limited by maximum channel temperature and avalanche current. See to 'Avalanche Energy' graph.

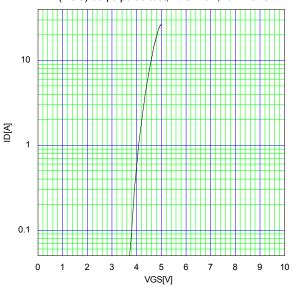
Note \*3 : Repetitive rating : Pulse width limited by maximum channel temperature.

See to the 'Transient Themal impeadance' graph. Note \*4 :  $I_F \le I_D$ ,  $-di/dt = 100A/\mu_S$ ,  $Vcc \le BV_{DSS}$ ,  $Tch \le 150^\circ C$ . Note \*5 :  $I_F \le I_D$ ,  $dv/dt = 5.0 kV/\mu_S$ ,  $Vcc \le BV_{DSS}$ ,  $Tch \le 150^\circ C$ .

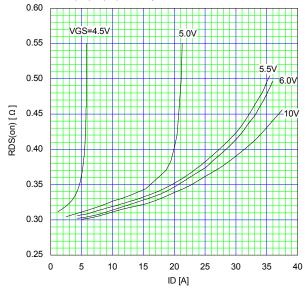


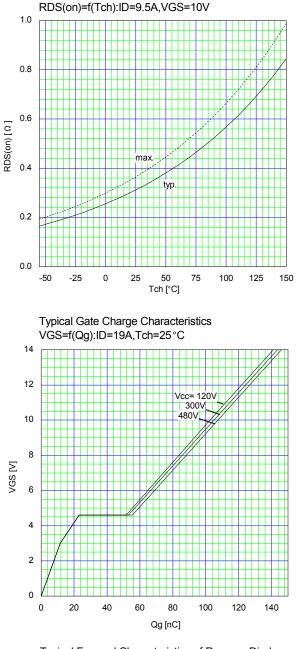


Typical Transfer Characteristic ID=f(VGS):80 μs pulse test,VDS=25V,Tch=25°C

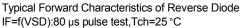


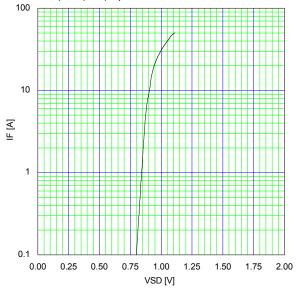
Typical Drain-Source on-state Resistance RDS(on)=f(ID):80 µs pulse test,Tch=25 °C

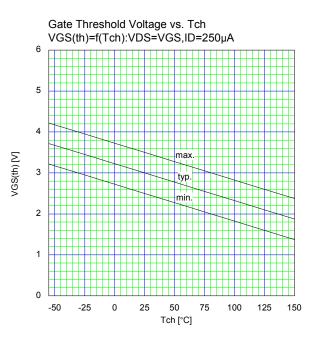




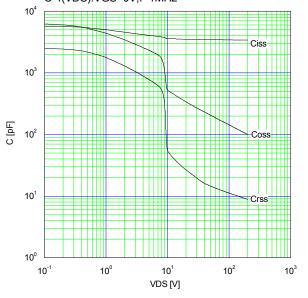
Drain-Source On-state Resistance



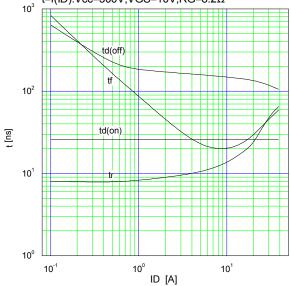


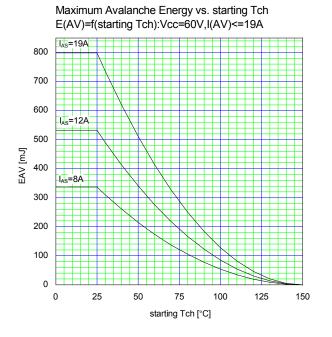


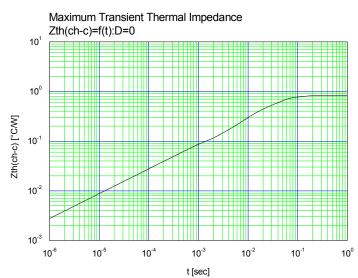
Typical Capacitance C=f(VDS):VGS=0V,f=1MHz



Typical Switching Characteristics vs. ID t=f(ID):Vcc=300V,VGS=10V,RG=8.2Ω







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