

FMH20N50E

FUJI POWER MOSFET

Super FAP-E³ series

N-CHANNEL SILICON POWER MOSFET

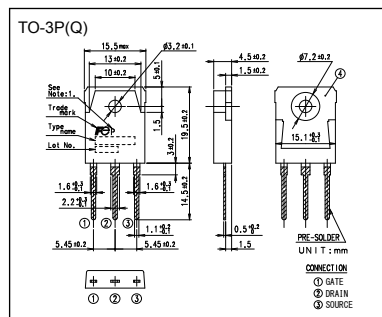
■ Features

- Maintains both low power loss and low noise
- Lower $R_{DS(on)}$ characteristic
- More controllable switching dv/dt by gate resistance
- Smaller V_{GS} ringing waveform during switching
- Narrow band of the gate threshold voltage ($3.0 \pm 0.5V$)
- High avalanche durability

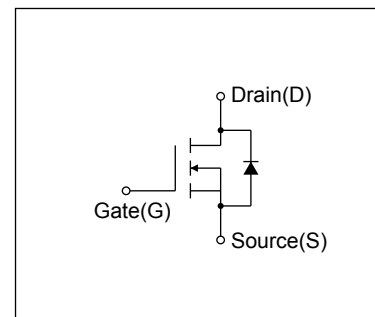
■ Applications

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

■ Outline Drawings [mm]



■ Equivalent circuit schematic



■ Maximum Ratings and Characteristics

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

Description	Symbol	Characteristics	Unit	Remarks
Drain-Source Voltage	V _{DS}	500	V	V _{GS} = -30V
	V _{DSX}	500	V	
Continuous Drain Current	I _D	±20	A	
Pulsed Drain Current	I _{DP}	±80	A	
Gate-Source Voltage	V _{GS}	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	I _{AR}	20	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E _{AS}	582.5	mJ	Note*2
Repetitive Maximum Avalanche Energy	E _{AR}	23.5	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	7.4	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/μs	Note*5
Maximum Power Dissipation	P _D	2.5	W	Ta=25°C
		235		Tc=25°C
Operating and Storage	T _{ch}	150	°C	
Temperature range	T _{stg}	-55 to +150	°C	

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

Description	Symbol	Conditions	min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	500	-	-	V
Gate Threshold Voltage	V _{GS} (th)	I _D =250μA, V _{DS} =V _{GS}	2.5	3.0	3.5	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V T _{ch} =25°C	-	-	25	μA
		V _{DS} =400V, V _{GS} =0V T _{ch} =125°C	-	-	250	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	-	10	100	nA
Drain-Source On-State Resistance	R _{DS} (on)	I _D =10A, V _{GS} =10V	-	0.27	0.31	Ω
Forward Transconductance	g _{fs}	I _D =10A, V _{DS} =25V	11	22	-	S
Input Capacitance	C _{iss}	V _{DS} =25V	-	2650	3980	pF
Output Capacitance	C _{oss}	V _{GS} =0V	-	250	375	
Reverse Transfer Capacitance	C _{rss}	f=1MHz	-	19	28.5	
Turn-On Time	t _d (on)	V _{cc} =300V	-	22	33	ns
	t _r	V _{GS} =10V	-	11	16.5	
Turn-Off Time	t _d (off)	I _D =10A	-	120	180	
	t _f	R _G =10Ω	-	21	31.5	
Total Gate Charge	Q _G	V _{cc} =250V	-	77	115.5	nC
Gate-Source Charge	Q _{GS}	I _D =20A	-	17	25.5	
Gate-Drain Charge	Q _{GD}	V _{GS} =10V	-	22	33	
Avalanche Capability	I _{AV}	L=1.07mH, T _{ch} =25°C	20	-	-	A
Diode Forward On-Voltage	V _{SD}	I _F =20A, V _{GS} =0V, T _{ch} =25°C	-	0.90	1.35	V
Reverse Recovery Time	t _{rr}	I _F =20A, V _{GS} =0V	-	0.5	-	μs
Reverse Recovery Charge	Q _{rr}	-di/dt=100A/μs, T _{ch} =25°C	-	7	-	μC

● Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to Case			0.532	°C/W
	Rth (ch-a)	Channel to Ambient			50.0	°C/W

Note *1 : Tch≤150°C

Note *2 : Stating Tch=25°C. I_{AS}=8A. L=16.7mH. V_{CC}=50V. R_G=50Ω

EAS limited by maximum channel temperature and avalanche current.
See to 'Avalanche Energy' graph.

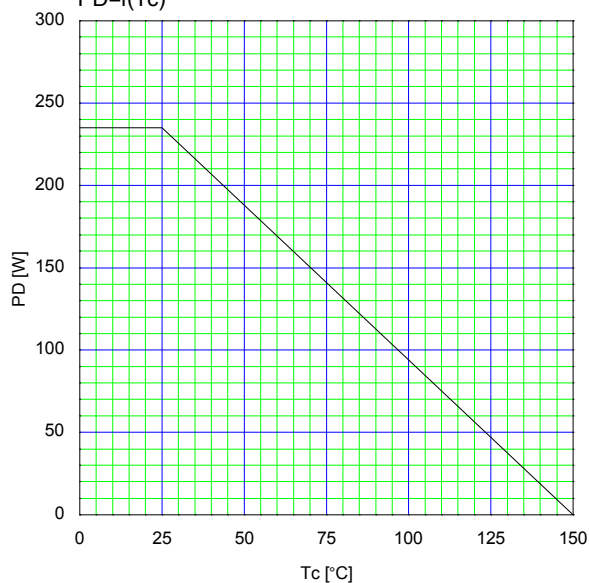
Note *3 : Repetitive rating : Pulse width limited by maximum channel temperature.

Note -3 : Repetitive rating : Pulse width limited by maximum
See to the 'Transient Thermal impedance' graph.

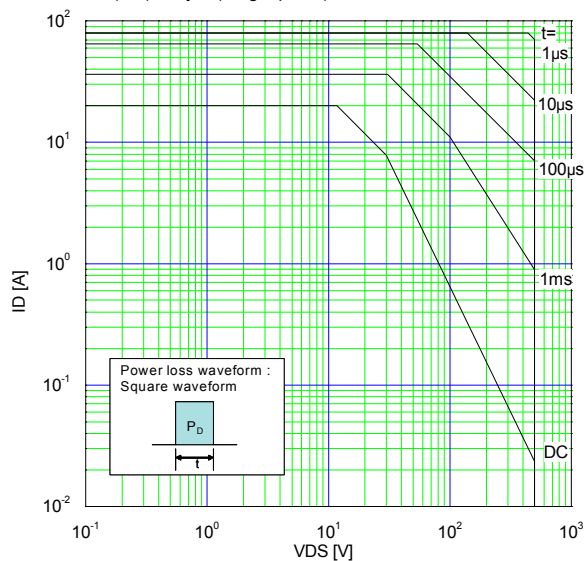
Note *4 : $I_F \leq I_D$, $-di/dt = 100A/\mu s$, $V_{CC} \leq BV_{DSS}$, $T_{ch} \leq 150^\circ C$.

Note *5 : $|I_{ES}| = |I_D|$, $dv/dt = 7.4 \text{ kV}/\mu\text{s}$, $V_{CC} \leq BV_{DSS}$, $T_{ch} \leq 150^\circ\text{C}$.

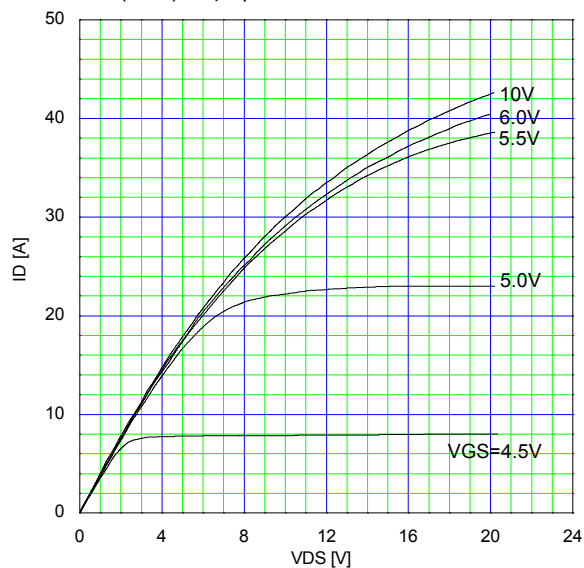
Allowable Power Dissipation
 $P_D = f(T_c)$



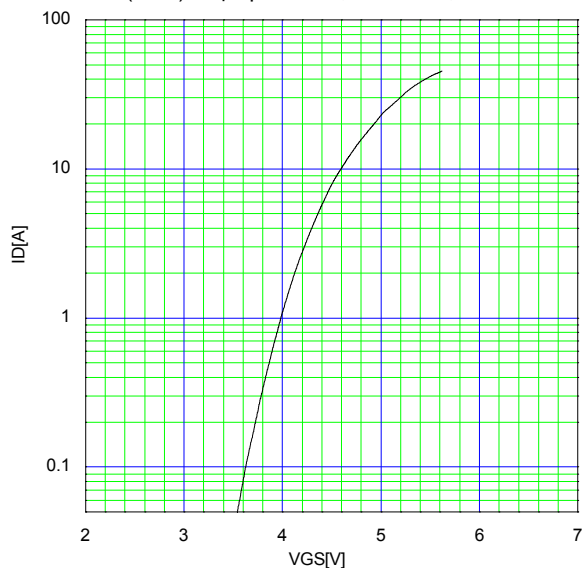
Safe Operating Area
 $I_D = f(V_{DS})$: Duty=0 (Single pulse), $T_c = 25^\circ\text{C}$



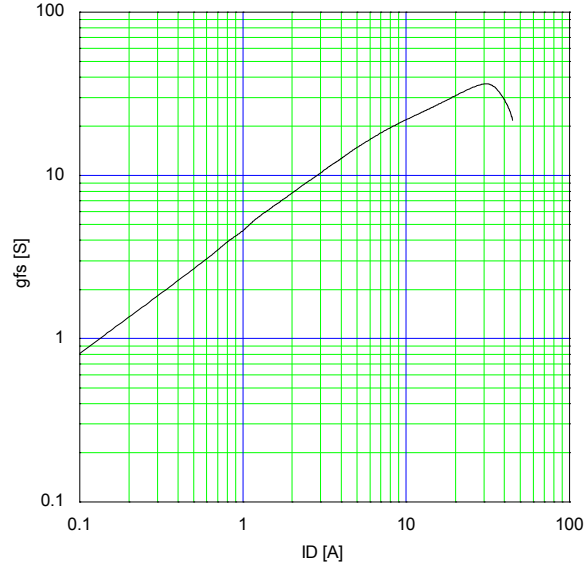
Typical Output Characteristics
 $I_D = f(V_{DS})$: 80 μs pulse test, $T_{ch} = 25^\circ\text{C}$



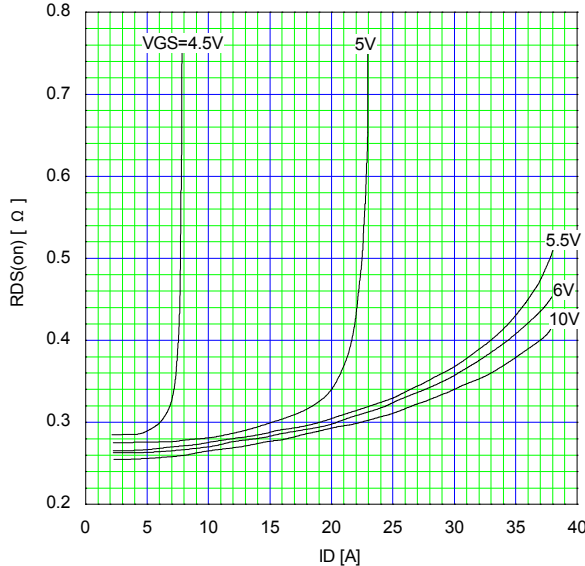
Typical Transfer Characteristic
 $I_D = f(V_{GS})$: 80 μs pulse test, $V_{DS} = 25\text{V}$, $T_{ch} = 25^\circ\text{C}$

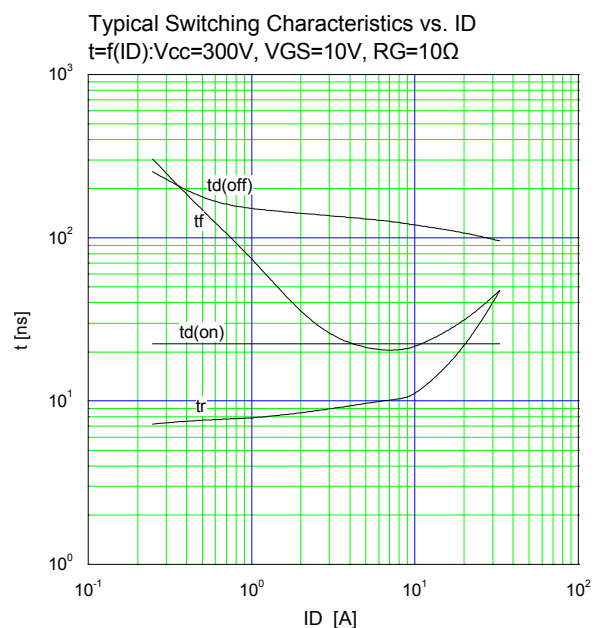
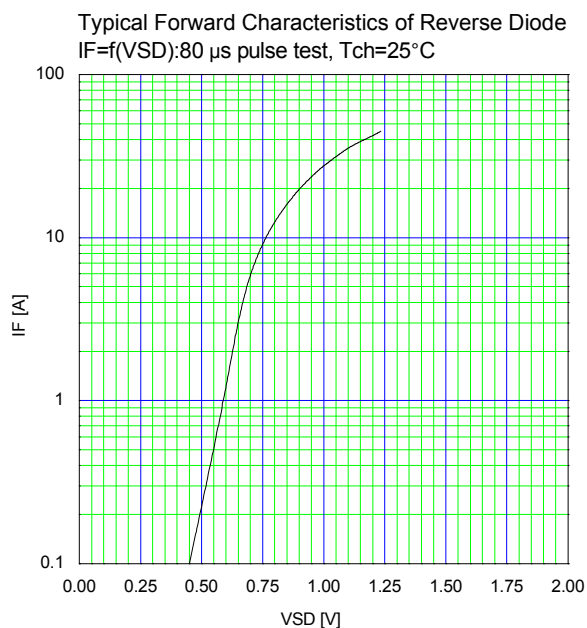
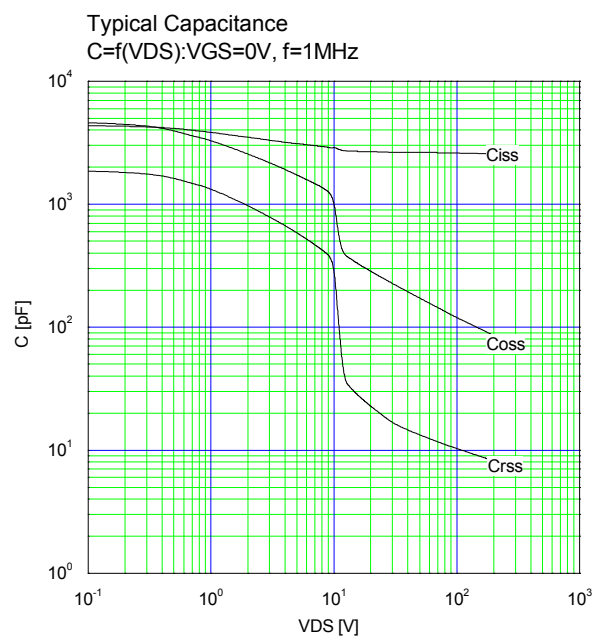
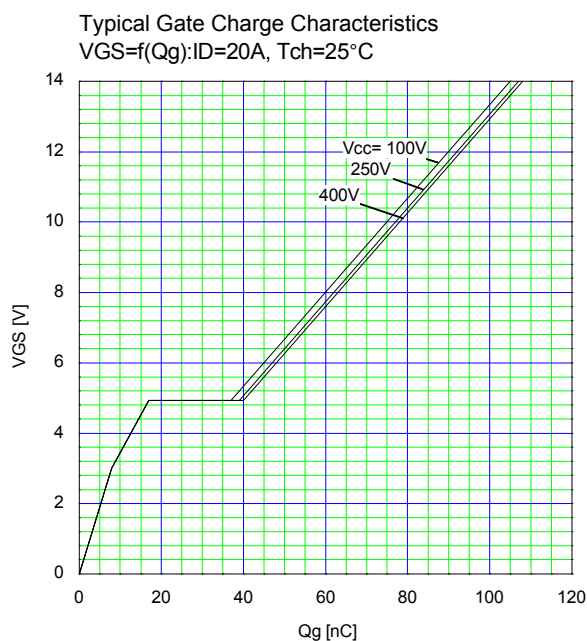
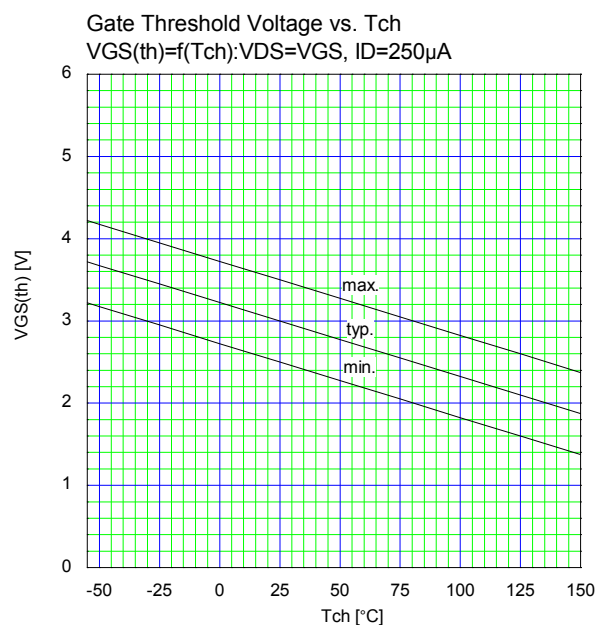
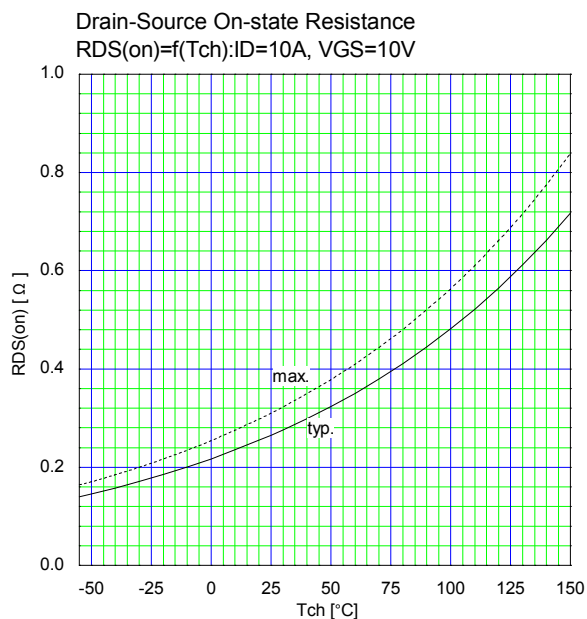


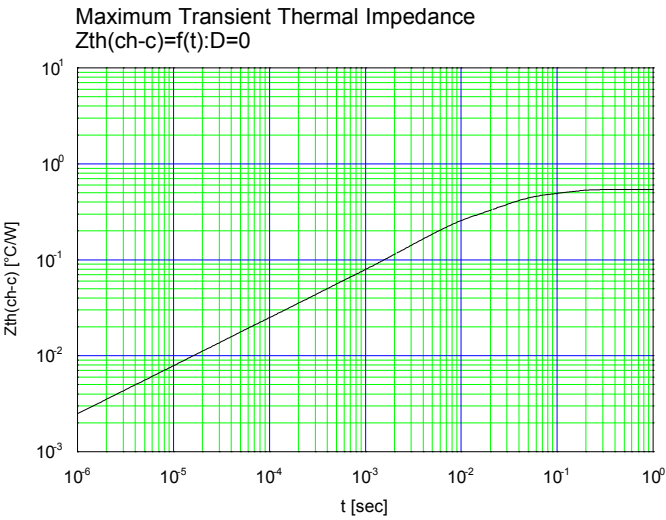
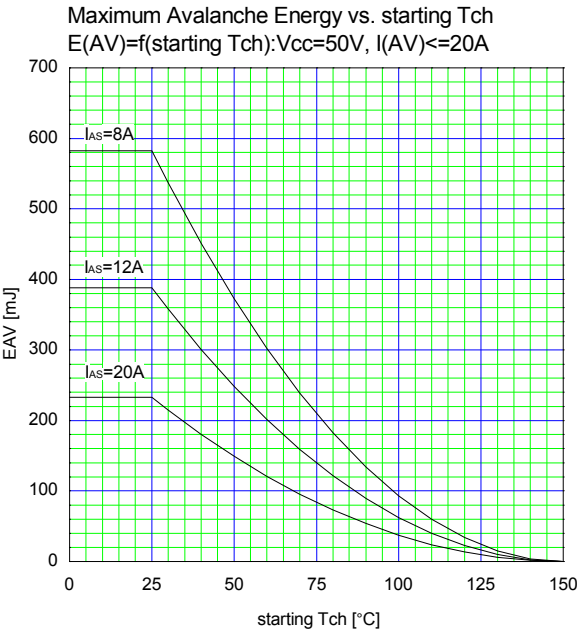
Typical Transconductance
 $g_{fs} = f(I_D)$: 80 μs pulse test, $V_{DS} = 25\text{V}$, $T_{ch} = 25^\circ\text{C}$



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







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