

# FMH06N90E

FUJI POWER MOSFET

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

## N-CHANNEL SILICON POWER MOSFET

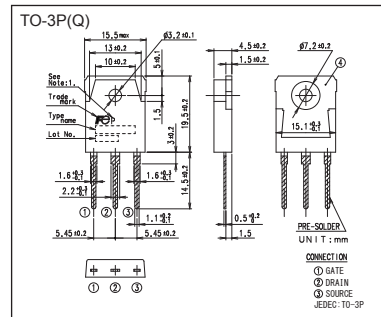
### Features

- Maintains both low power loss and low noise
- Lower R<sub>DS(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 (4.0±0.5V)
- High avalanche durability

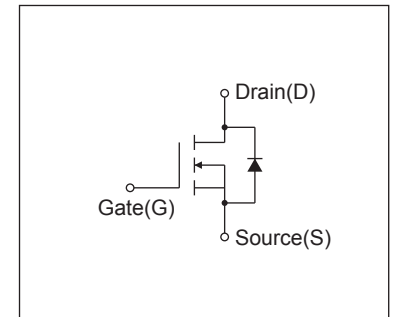
### Applications

- 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>	900	V	
	V <sub>DSX</sub>	900	V	V <sub>GS</sub> = -30V
Continuous Drain Current	I <sub>D</sub>	±6	A	
Pulsed Drain Current	I <sub>DP</sub>	±24	A	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	I <sub>AR</sub>	6	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E <sub>AS</sub>	323.6	mJ	Note*2
Repetitive Maximum Avalanche Energy	E <sub>AR</sub>	11.5	mJ	Note*3
Peak Diode Recovery dv/dt	dv/dt	2.0	kV/μs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/μs	Note*5
Maximum Power Dissipation	P <sub>D</sub>	2.5	W	T <sub>a</sub> =25°C
		115		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	

#### 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	900	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	3.5	4.0	4.5	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V	-	-	25	μA
		V <sub>DS</sub> =720V, 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(on)</sub>	I <sub>D</sub> =3.0A, V <sub>GS</sub> =10V	-	2.1	2.5	Ω
Forward Transconductance	g <sub>fs</sub>	I <sub>D</sub> =3.0A, V <sub>DS</sub> =25V	3.5	7.0	-	S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V	-	980	1500	pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> =0V	-	95	150	
Reverse Transfer Capacitance	C <sub>rss</sub>	f=1MHz	-	6.5	10	
Turn-On Time	td(on)	V <sub>cc</sub> =600V	-	33	50	ns
	tr	V <sub>GS</sub> =10V	-	32	48	
Turn-Off Time	td(off)	I <sub>D</sub> =3.0A	-	100	150	
	tf	R <sub>G</sub> =39Ω	-	32	48	
Total Gate Charge	Q <sub>G</sub>	V <sub>cc</sub> =450V	-	33	50	nC
Gate-Source Charge	Q <sub>GS</sub>	I <sub>D</sub> =6A	-	10	15	
Drain-Source Crossover Charge	Q <sub>SW</sub>	V <sub>GS</sub> =10V	-	3.5	5.5	
Gate-Drain Charge	Q <sub>GD</sub>	See Fig.5	-	11	17	
Avalanche Capability	I <sub>AV</sub>	L=6.59mH, T <sub>ch</sub> =25°C	6	-	-	A
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =6A, V <sub>GS</sub> =0V, T <sub>ch</sub> =25°C	-	0.90	1.35	V
Reverse Recovery Time	trr	I <sub>F</sub> =6A, V <sub>GS</sub> =0V	-	1.6	-	μs
Reverse Recovery Charge	Q <sub>rr</sub>	-di/dt=100A/μs, T <sub>ch</sub> =25°C	-	9.5	-	μC

#### Thermal Characteristics

Description	Symbol	min.	typ.	max.	Unit
Thermal resistance	R <sub>th(ch-c)</sub>			1.087	°C/W
	R <sub>th(ch-a)</sub>			50.0	°C/W

Note \*1 : T<sub>ch</sub>≤150°C.

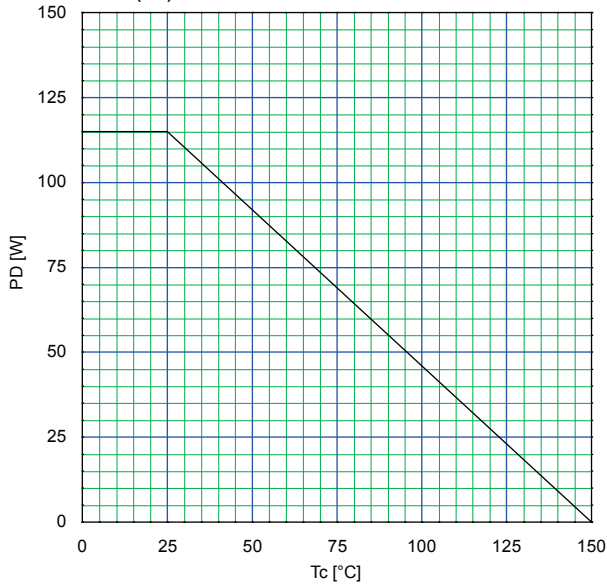
Note \*2 : Stating T<sub>ch</sub>=25°C, I<sub>AS</sub>=2.4A, L=103mH, V<sub>cc</sub>=90V, R<sub>G</sub>=10Ω.  
E<sub>AS</sub> limited by maximum channel temperature and avalanche current.  
See to 'Avalanche current' graph.

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

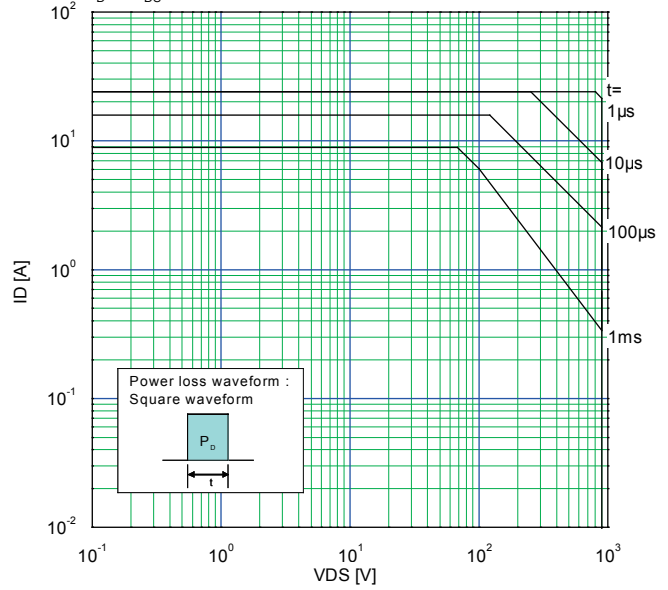
Note \*4 : I<sub>F</sub>≤I<sub>D</sub>, -di/dt=100A/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

Note \*5 : I<sub>F</sub>≤I<sub>D</sub>, dv/dt=2.0kV/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

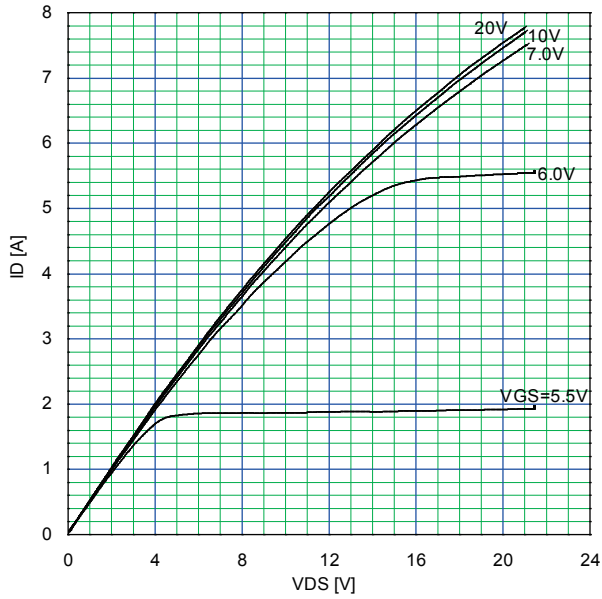
Allowable Power Dissipation  
 $PD=f(T_c)$



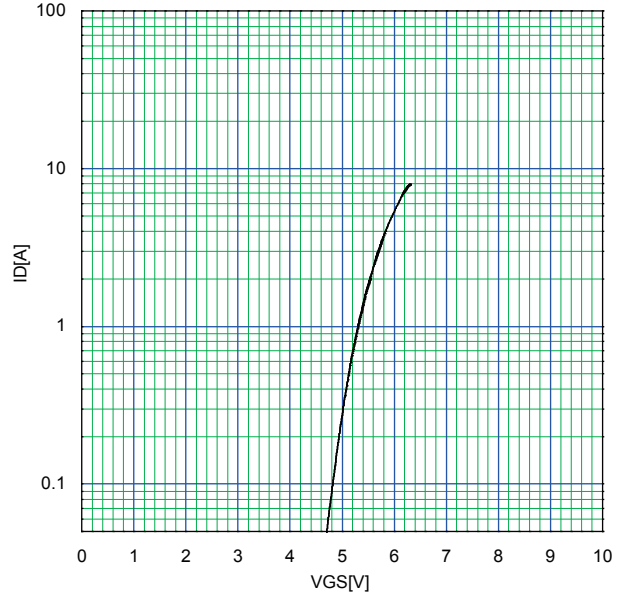
Safe Operating Area  
 $I_D=f(V_{DS}): Duty=0(\text{Single pulse}), T_c=25^\circ\text{C}$



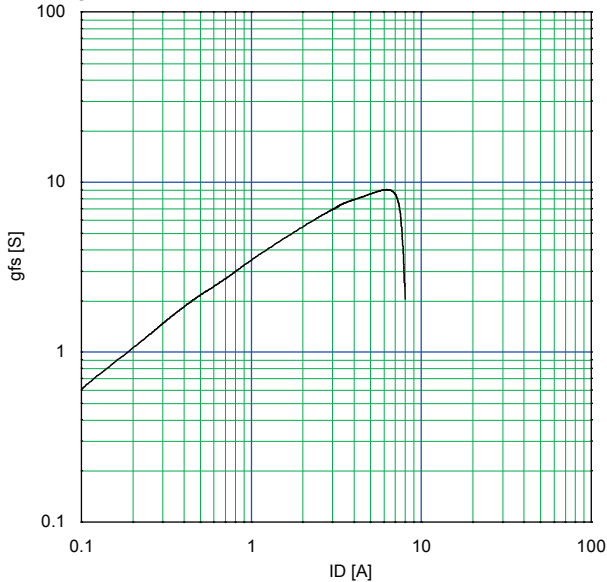
Typical Output Characteristics  
 $I_D=f(V_{DS}): 80\mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



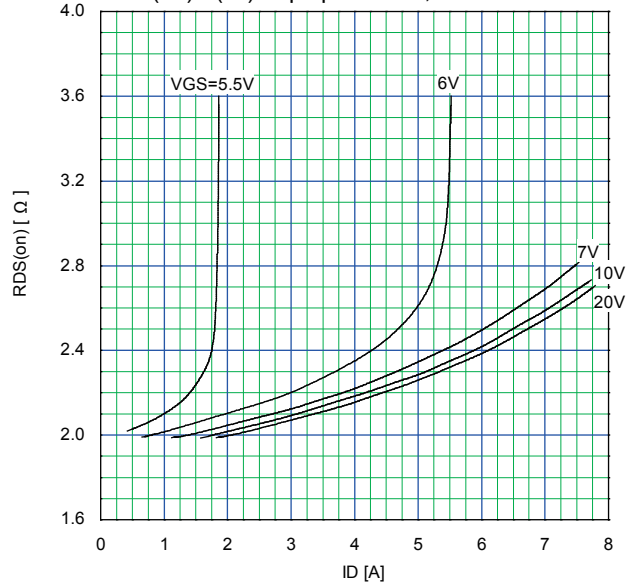
Typical Transfer Characteristic  
 $I_D=f(V_{GS}): 80\mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



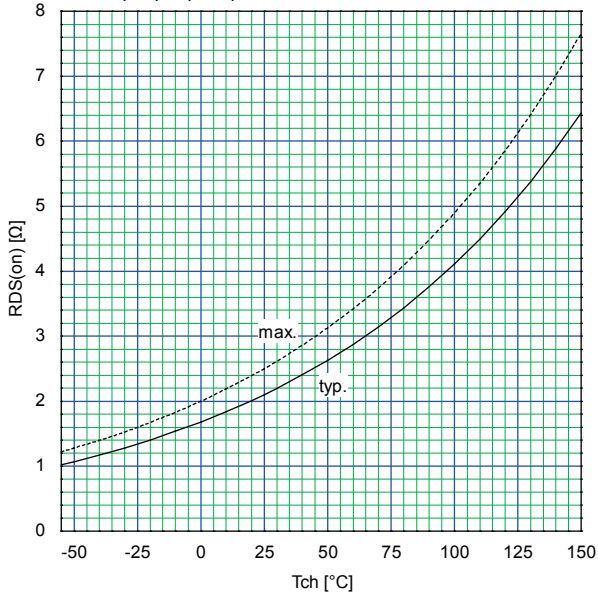
Typical Transconductance  
 $g_{fs}=f(I_D): 80\mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



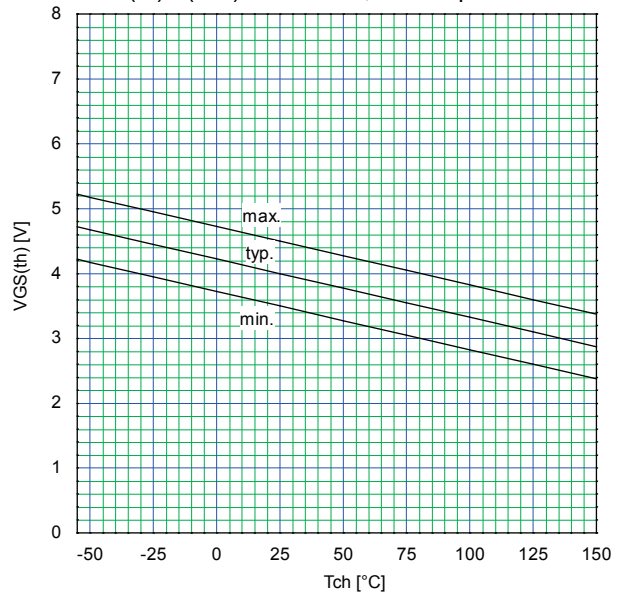
Typical Drain-Source on-state Resistance  
 $R_{DS(on)}=f(I_D): 80\mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



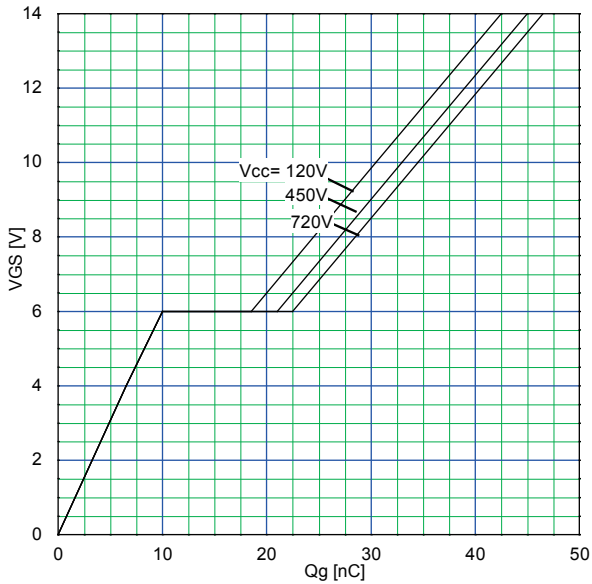
Drain-Source On-state Resistance  
 $R_{DS(on)}=f(T_{ch}):I_D=3.0A, V_{GS}=10V$



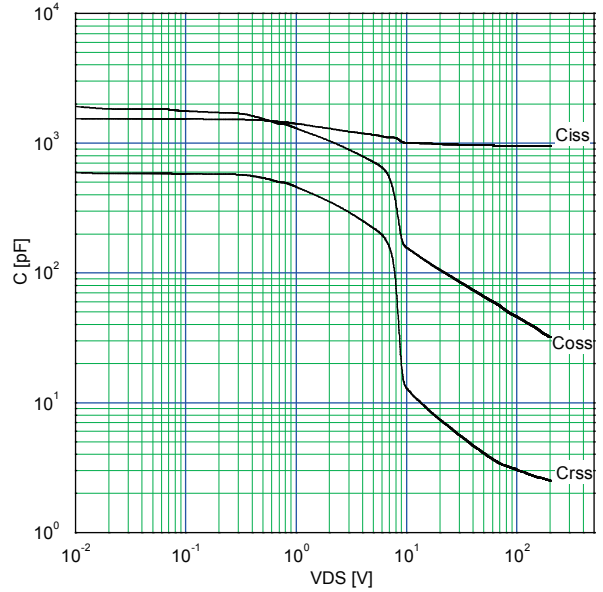
Gate Threshold Voltage vs. T<sub>ch</sub>  
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=250\mu A$



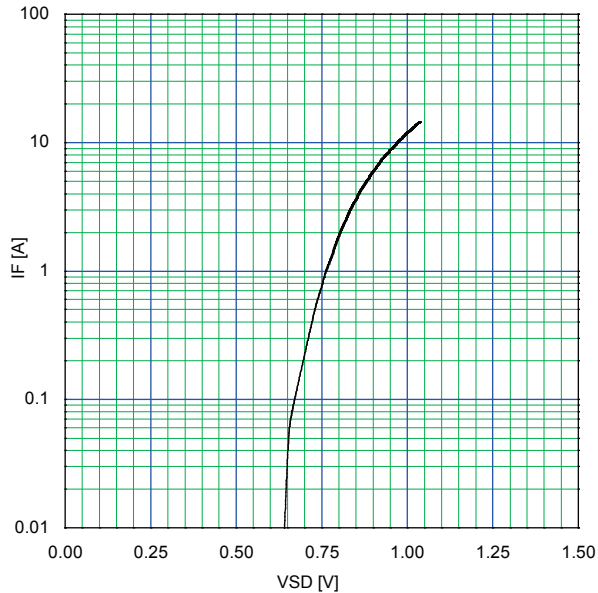
Typical Gate Charge Characteristics  
 $V_{GS}=f(Q_g):I_D=6A, T_{ch}=25^\circ C$



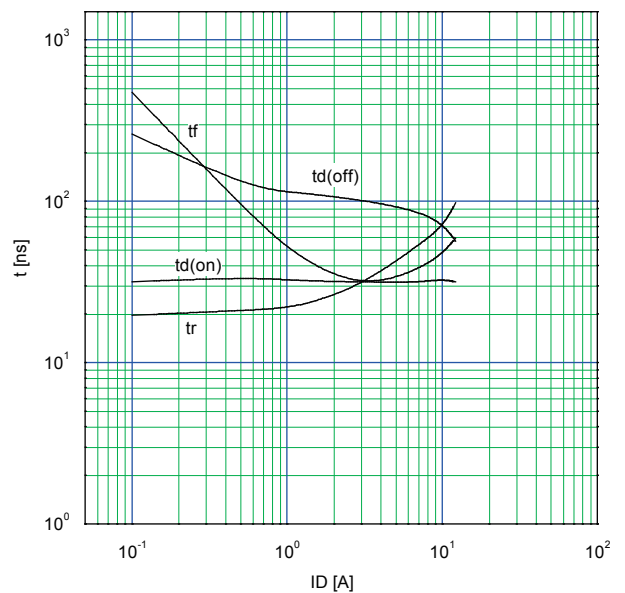
Typical Capacitance  
 $C=f(V_{DS}):V_{GS}=0V, f=1MHz$



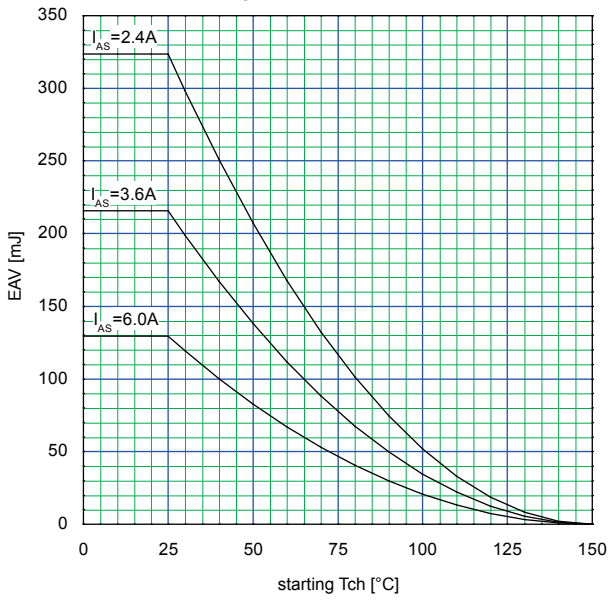
Typical Forward Characteristics of Reverse Diode  
 $I_F=f(V_{SD}):80\mu s$  pulse test,  $T_{ch}=25^\circ C$



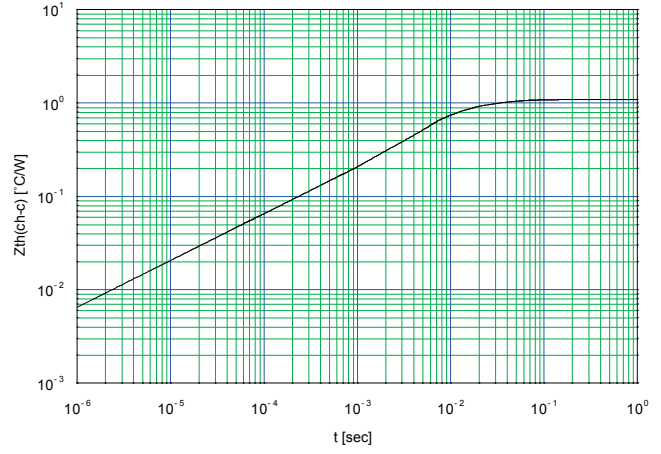
Typical Switching Characteristics vs. ID  
 $t=f(I_D):V_{cc}=600V, V_{GS}=10V, R_G=39\Omega$



Maximum Avalanche Energy vs. starting Tch  
 $E(AV)=f(\text{startingTch}):V_{CC}=90V, I(AV)\leq 6A$



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



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