

# FMV10N80E

FUJI POWER MOSFET

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

## N-CHANNEL SILICON POWER MOSFET

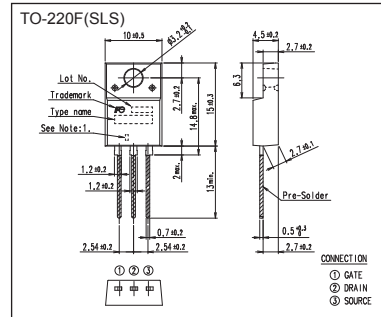
### Features

- 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

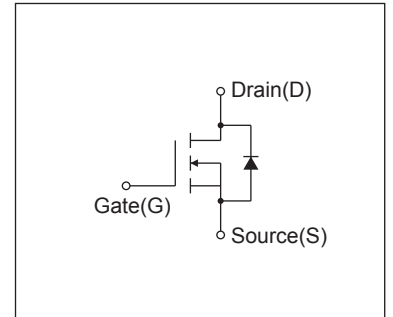
### Applications

- 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>	800	V	
	V <sub>DSX</sub>	800	V	V <sub>GS</sub> = -30V
Continuous Drain Current	I <sub>D</sub>	±10	A	
Pulsed Drain Current	I <sub>DP</sub>	±40	A	
Gate-Source Voltage	V <sub>GS</sub>	±30	V	
Repetitive and Non-Repetitive Maximum Avalanche Current	I <sub>AR</sub>	10	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E <sub>AS</sub>	572.4	mJ	Note*2
Repetitive Maximum Avalanche Energy	E <sub>AR</sub>	8.5	mJ	Note*3
Peak Diode Recovery dv/dt	dv/dt	2.1	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
		85		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)

##### Static Ratings

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	800	-	-	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> =800V, V <sub>GS</sub> =0V	-	-	25	μA
		V <sub>DS</sub> =640V, 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> =5.0A, V <sub>GS</sub> =10V	-	0.9	1.1	Ω
Forward Transconductance	g <sub>fs</sub>	I <sub>D</sub> =5.0A, V <sub>DS</sub> =25V	5.0	10	-	S
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V	-	1650	2500	pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> =0V	-	165	250	
Reverse Transfer Capacitance	C <sub>rss</sub>	f=1MHz	-	11	17	
Turn-On Time	td(on) tr	V <sub>cc</sub> =600V	-	34	51	ns
		V <sub>GS</sub> =10V	-	32	48	
Turn-Off Time	td(off) tf	I <sub>D</sub> =5.0A	-	105	160	
		R <sub>G</sub> =24Ω	-	30	45	
Total Gate Charge	Q <sub>G</sub>	V <sub>cc</sub> =450V	-	50	75	nC
Gate-Source Charge	Q <sub>GS</sub>	I <sub>D</sub> =10A	-	14	21	
Drain-Source Crossover Charge	Q <sub>SW</sub>	V <sub>GS</sub> =10V	-	6	9	
Gate-Drain Charge	Q <sub>GD</sub>	See Fig.5	-	17	26	
Avalanche Capability	I <sub>AV</sub>	L=4.20mH, T <sub>ch</sub> =25°C	10	-	-	
Diode Forward On-Voltage	V <sub>SD</sub>	I <sub>F</sub> =10A, 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> =10A, V <sub>GS</sub> =0V	-	1.8	-	μS
Reverse Recovery Charge	Q <sub>rr</sub>	-di/dt=100A/μs, T <sub>ch</sub> =25°C	-	15	-	μC

#### Thermal Characteristics

Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	R <sub>th(ch-c)</sub>	Channel to case			0.862	°C/W
	R <sub>th(ch-a)</sub>	Channel to ambient			50.0	°C/W

Note \*1 : T<sub>ch</sub>≤150°C.

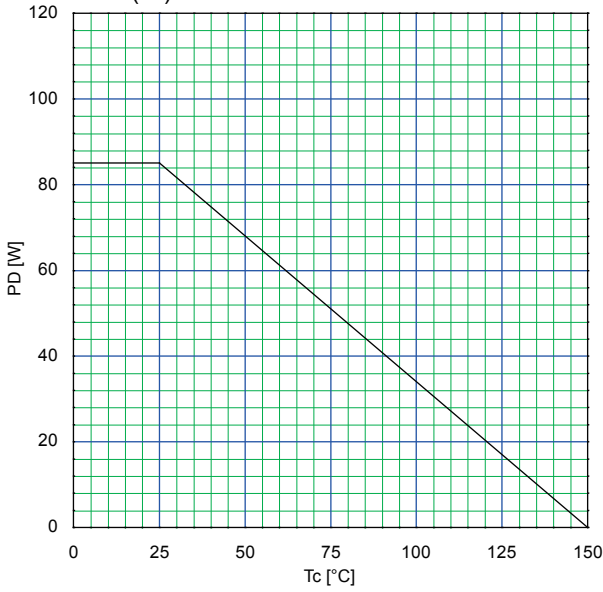
Note \*2 : Stating T<sub>ch</sub>=25°C, I<sub>AS</sub>=4.0A, L=65.6mH, V<sub>cc</sub>=80V, R<sub>G</sub>=10Ω.  
E<sub>AS</sub> limited by maximum channel temperature and avalanche current.

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

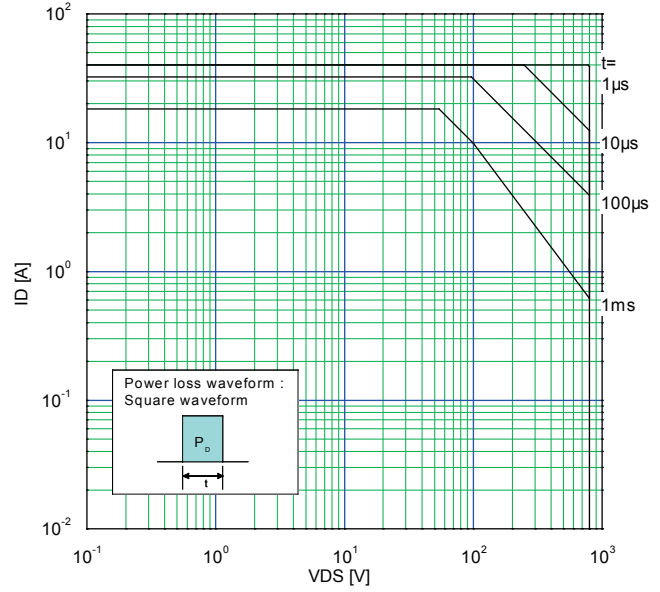
Note \*4 : I<sub>F</sub>≤I<sub>D</sub>, -di/dt=100A/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

Note \*5 : I<sub>F</sub>≤I<sub>D</sub>, dv/dt=2.1kV/μs, V<sub>cc</sub>≤BV<sub>DSS</sub>, T<sub>ch</sub>≤150°C.

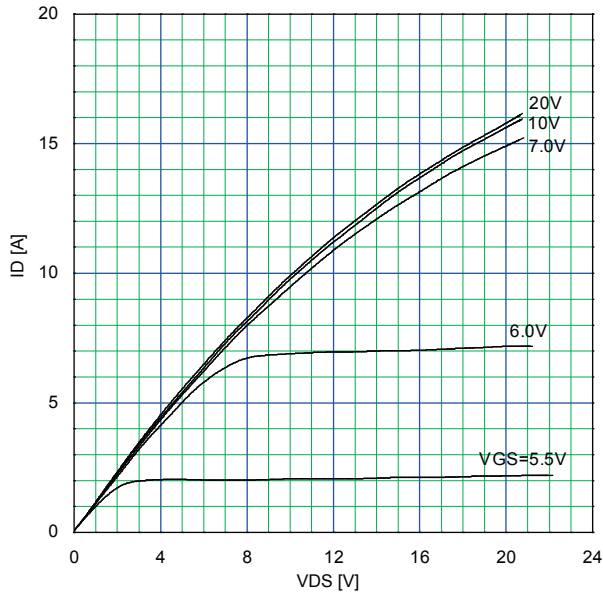
Allowable Power Dissipation  
 $PD=f(T_c)$



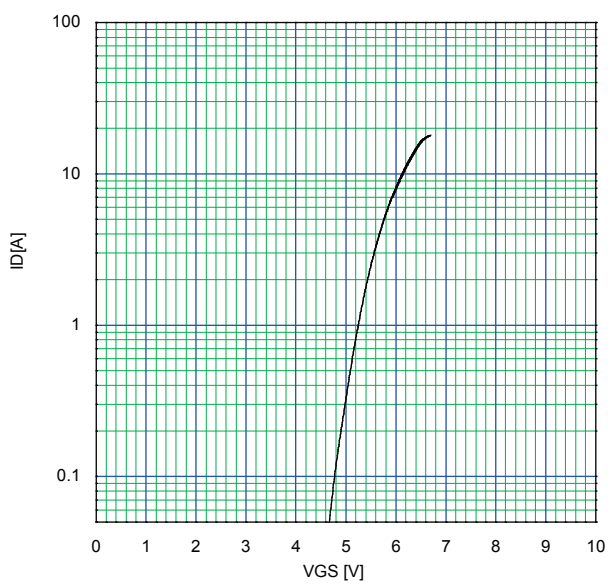
Safe Operating Area  
 $I_D=f(V_{DS}): Duty=0(\text{Single pulse}), T_c=25^\circ\text{C}$



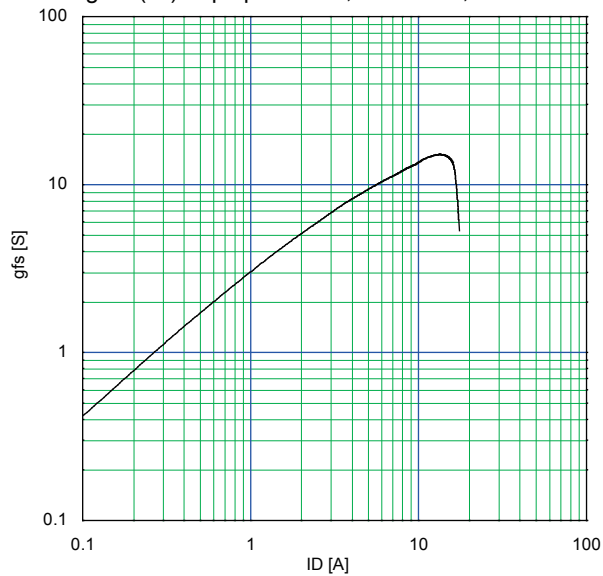
Typical Output Characteristics  
 $I_D=f(V_{DS}): 80\mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



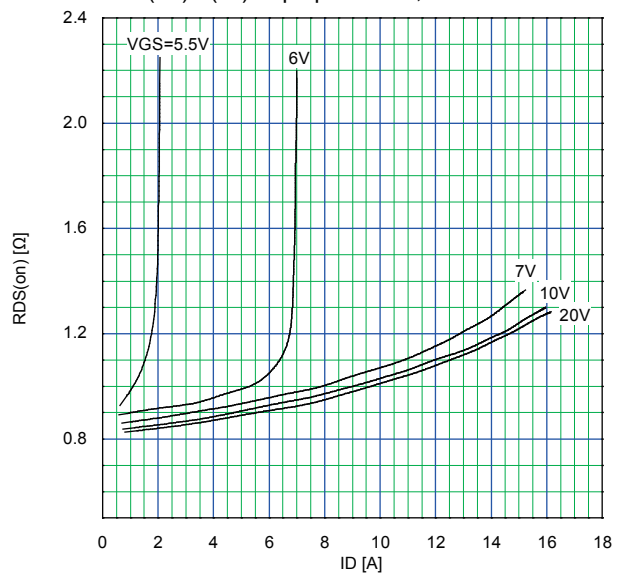
Typical Transfer Characteristic  
 $I_D=f(V_{GS}): 80\mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



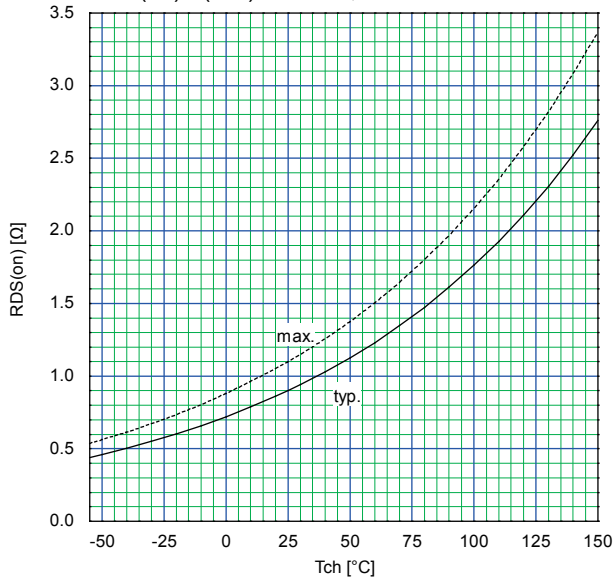
Typical Transconductance  
 $g_{fs}=f(I_D): 80\mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



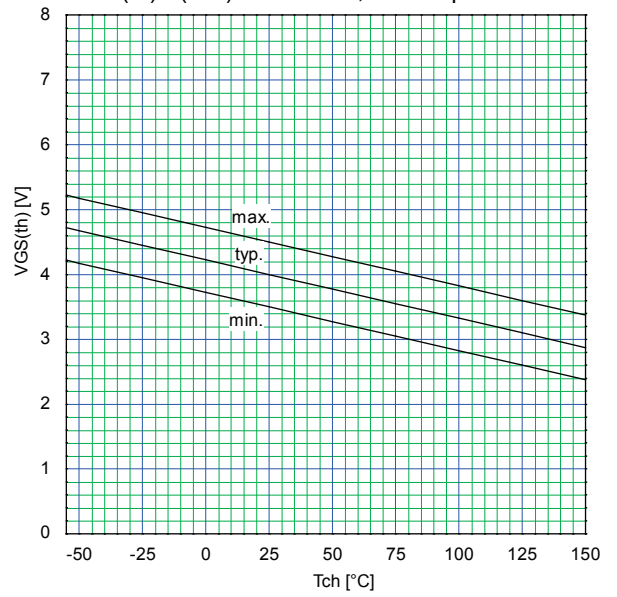
Typical Drain-Source on-state Resistance  
 $R_{DS(on)}=f(I_D): 80\mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



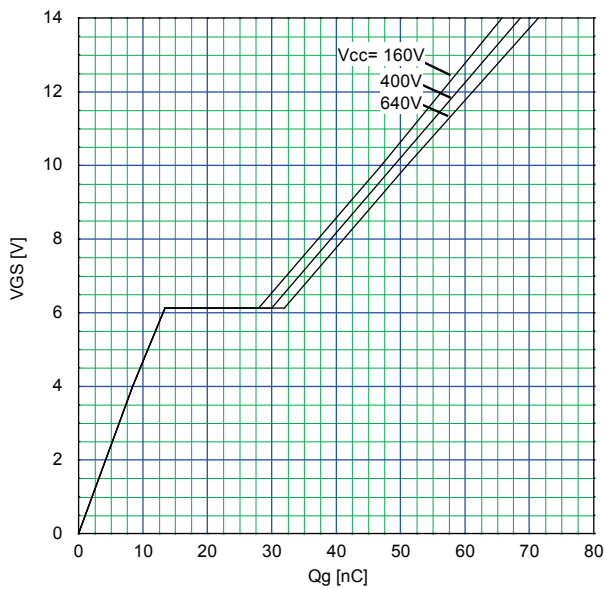
Drain-Source On-state Resistance  
 $R_{DS(on)}=f(T_{ch}):I_D=5.0A, V_{GS}=10V$



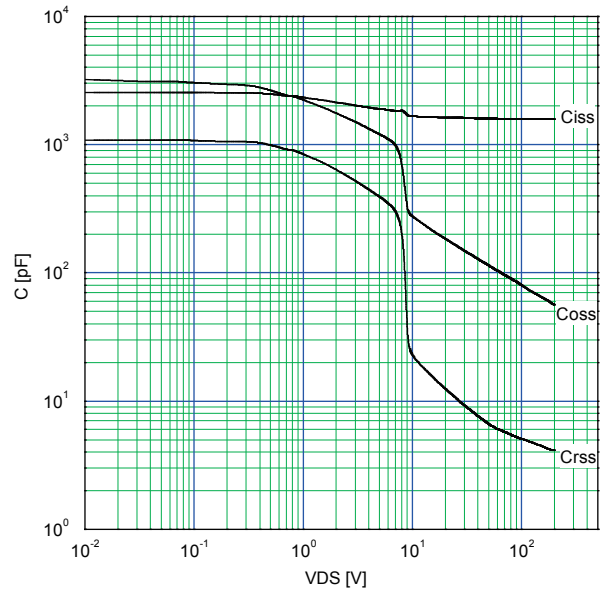
Gate Threshold Voltage vs.  $T_{ch}$   
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=250\mu A$



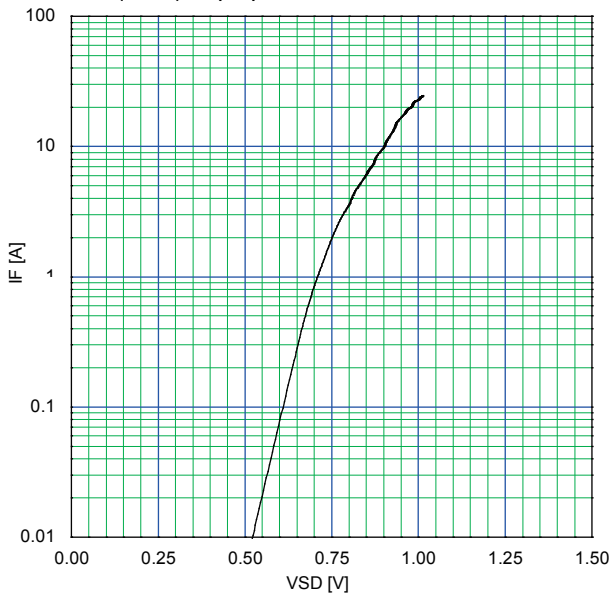
Typical Gate Charge Characteristics  
 $V_{GS}=f(Q_g):I_D=10A, T_{ch}=25^\circ C$



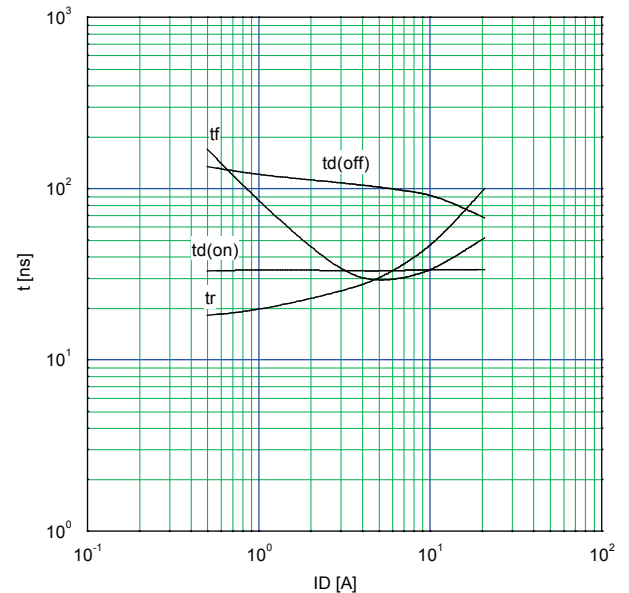
Typical Capacitance  
 $C=f(V_{DS}):V_{GS}=0V, f=1MHz$



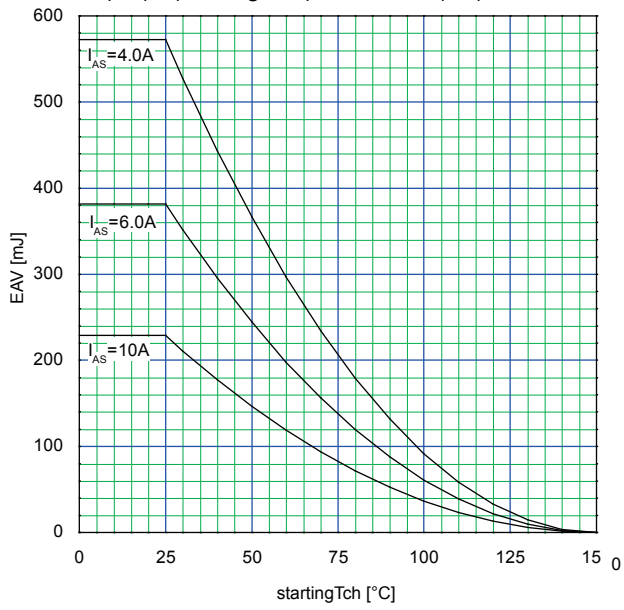
Typical Forward Characteristics of Reverse Diode  
 $I_F=f(V_{SD}):80\mu s$  pulse test,  $T_{ch}=25^\circ C$



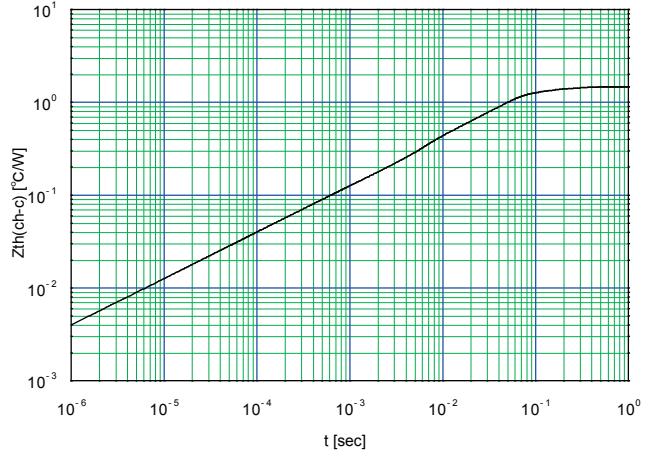
Typical Switching Characteristics vs.  $I_D$   
 $t=f(I_D):V_{cc}=600V, V_{GS}=10V, R_G=24\Omega$



Maximum Avalanche Energy vs. starting Tch  
 $E(AV)=f(\text{starting Tch}):V_{CC}=80V, I(AV)\leq 10A$



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



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