

## N-CHANNEL SILICON POWER MOS-FET

### Features

- High speed switching
- Low on-resistance
- No secondary breakdown
- Low driving power
- Avalanche-proof

### Applications

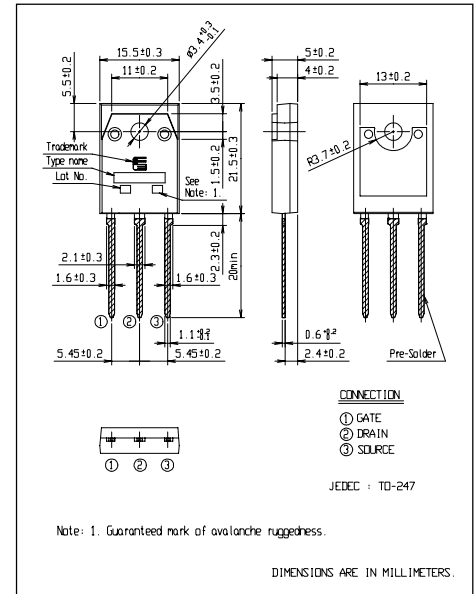
- Switching regulators
- UPS (Uninterruptible Power Supply)
- DC-DC converters

### Maximum ratings and characteristic Absolute maximum ratings

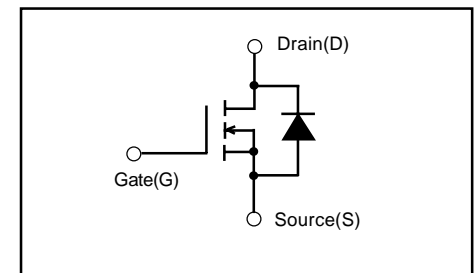
(T<sub>c</sub>=25°C unless otherwise specified)

Item	Symbol	Rating	Unit
Drain-source voltage	V <sub>DS</sub>	400	V
Continuous drain current	I <sub>D</sub>	±23	A
Pulsed drain current	I <sub>D(puls)</sub>	±92	A
Gate-source voltage	V <sub>GS</sub>	±30	V
Repetitive or non-repetitive	IAR *2	23	A
Maximum Avalanche Energy	EAV *1	545	mJ
Max. power dissipation	P <sub>D</sub>	295	W
Operating and storage temperature range	T <sub>ch</sub> T <sub>stg</sub>	+150 -55 to +150	°C

\*1 L=1.89mH, V<sub>cc</sub>=40V \*2 T<sub>ch</sub>=150°C



### Equivalent circuit schematic



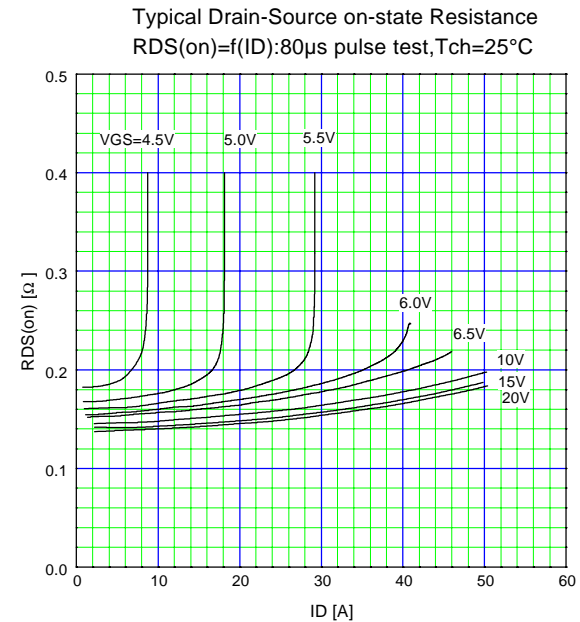
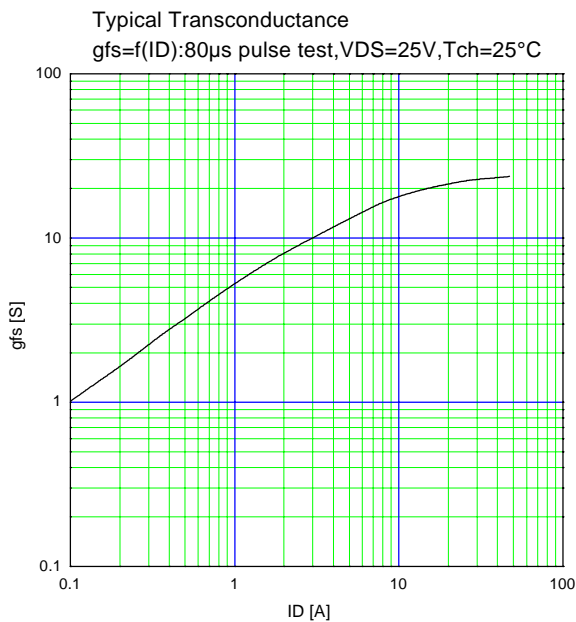
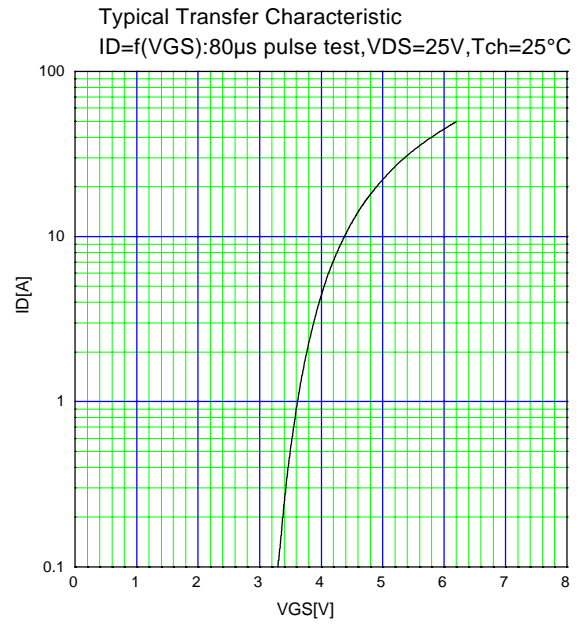
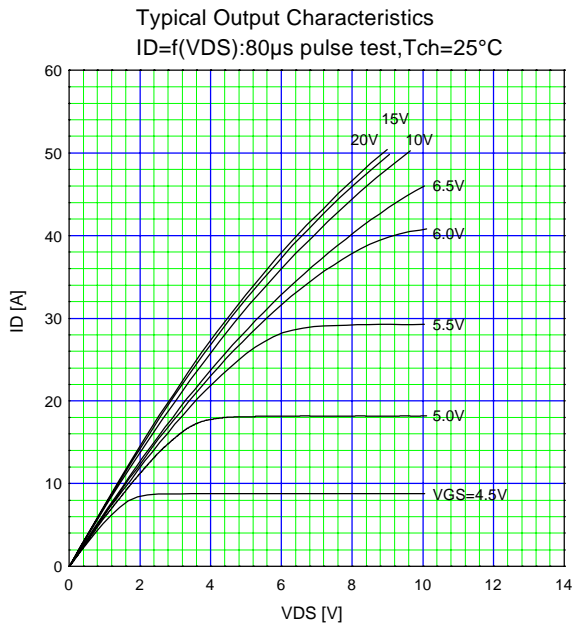
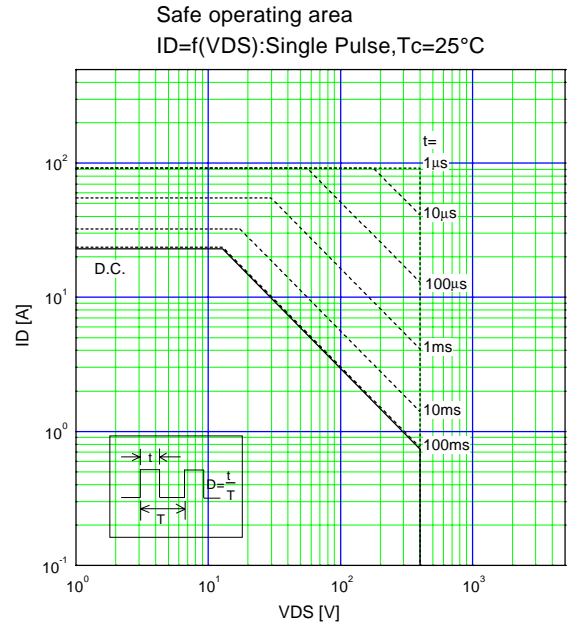
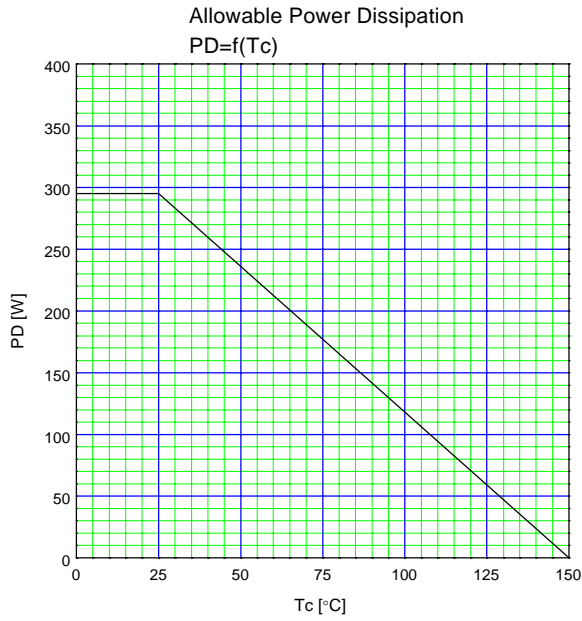
### Electrical characteristics (T<sub>c</sub> =25°C unless otherwise specified)

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =1mA V <sub>GS</sub> =0V	400			V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =1mA V <sub>DS</sub> =V <sub>GS</sub>	2.5	3.0	3.5	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =400V V <sub>GS</sub> =0V	T <sub>ch</sub> =25°C	10	500	μA
			T <sub>ch</sub> =125°C	0.2	1.0	mA
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> =11.5A V <sub>GS</sub> =10V		0.16	0.2	Ω
Forward transconductance	g <sub>fs</sub>	I <sub>D</sub> =11.5A V <sub>DS</sub> =25V	8.5	17		S
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V		2650	3975	pF
Output capacitance	C <sub>oss</sub>	V <sub>GS</sub> =0V		500	750	pF
Reverse transfer capacitance	C <sub>rss</sub>	f=1MHz		230	345	pF
Turn-on time t <sub>on</sub>	td(on)	V <sub>CC</sub> =300V I <sub>D</sub> =23A		22	35	ns
	t <sub>r</sub>	V <sub>GS</sub> =10V		105	160	
Turn-off time t <sub>off</sub>	td(off)	R <sub>GS</sub> =10Ω		225	340	ns
	t <sub>f</sub>			120	180	
Total gate charge	Q <sub>G</sub>	V <sub>CC</sub> =200V		137	210	nC
Gate-Source charge	Q <sub>GS</sub>	I <sub>D</sub> =23A		36	55	
Gate-Drain charge	Q <sub>GD</sub>	V <sub>GS</sub> =10V		48	75	
Avalanche capability	I <sub>AV</sub>	L=1.89mH T <sub>ch</sub> =25°C	23			A
Diode forward on-voltage	V <sub>SD</sub>	I <sub>F</sub> =2xI <sub>DR</sub> V <sub>GS</sub> =0V T <sub>ch</sub> =25°C		1.15	1.73	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =I <sub>DR</sub> V <sub>GS</sub> =0V		450		ns
Reverse recovery charge	Q <sub>rr</sub>	-di/dt=100A/μs T <sub>ch</sub> =25°C		8.6		μC

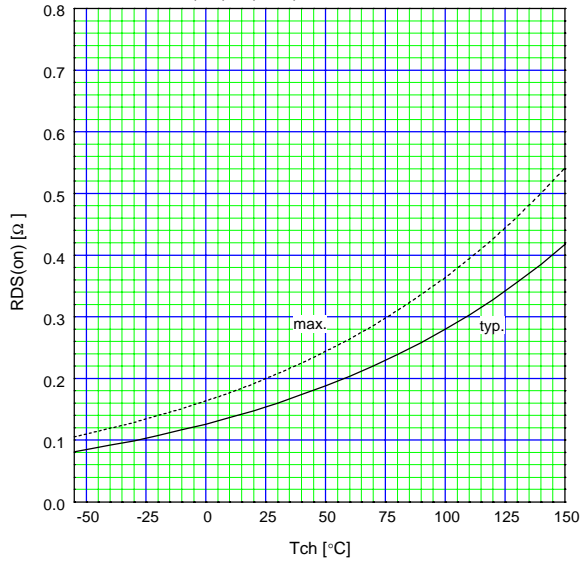
### Thermal characteristics

Item	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal resistance	R <sub>th(ch-c)</sub>	channel to case			0.424	°C/W
	R <sub>th(ch-a)</sub>	channel to ambient			50.0	°C/W

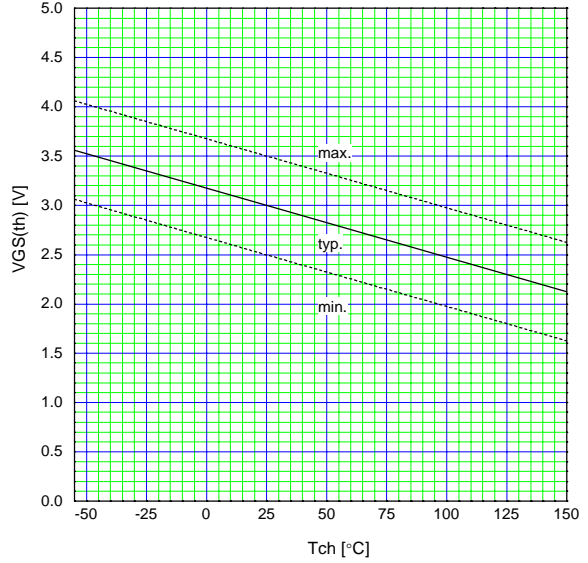
Characteristics



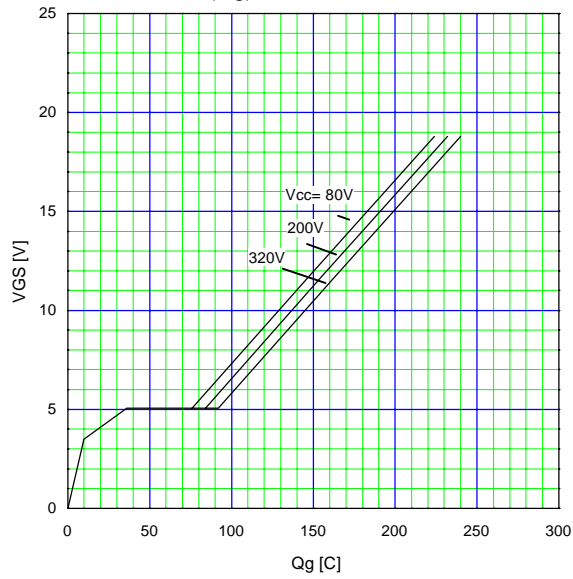
Drain-Source On-state Resistance  
 $R_{DS(on)}=f(T_{ch}):I_D=11.5A, V_{GS}=10V$



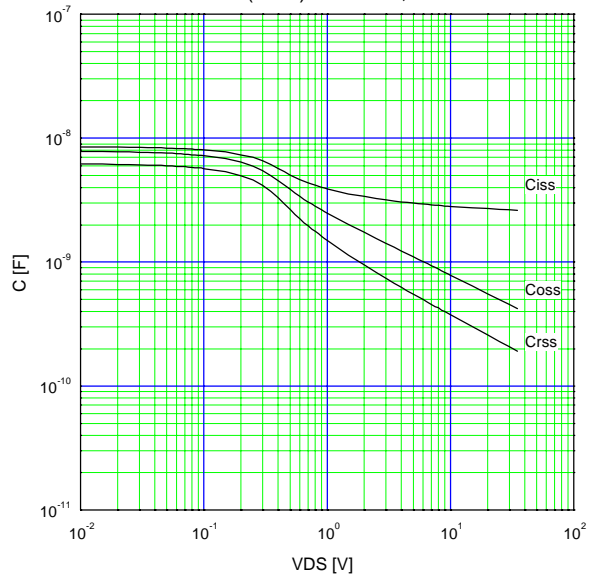
Gate Threshold Voltage vs.  $T_{ch}$   
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=1mA$



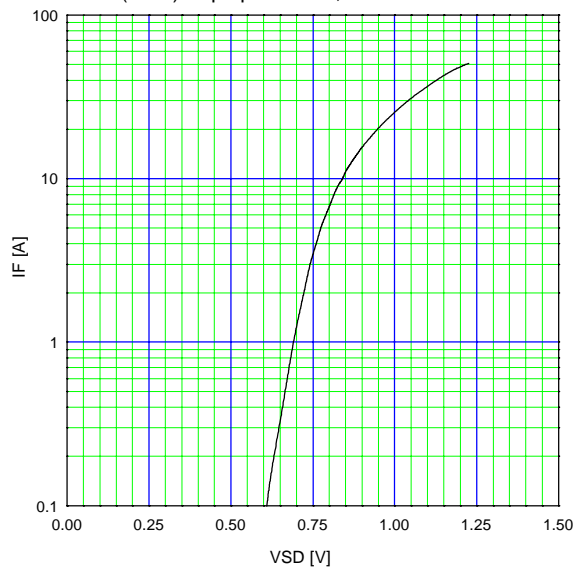
Typical Gate Charge Characteristics  
 $V_{GS}=f(Q_g):I_D=23A, T_{ch}=25^{\circ}C$



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.  $I_D$   
 $t=f(I_D):V_{CC}=300V, V_{GS}=10V, R_G=10\Omega$

