ShinDengen

P170FZ6QNKA

Power MOSFETs
60V, 170A, N-channel

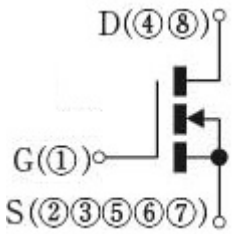
Feature

- N-channel
- SMD
- Super Large Current
- Low Ron
- 10V Gate Drive
- Low Capacitance
- Based on AEC-Q101
- Halogen free
- Pb free terminal
- RoHS:Yes

OUTLINE

Package (House Name): FZ-7p
Package (JEDEC Code): TO-263SC

Equivalent circuit



Absolute Maximum Ratings (unless otherwise specified : Tc=25℃)

Item	Symbol	Conditions	Ratings	Unit
Storage temperature	Tstg		-55 to 175	℃
Channel tempertature	Tch		-55 to 175	℃
Drain-source voltage	V_{DSS}		60	V
Gate-source voltage	V_{GSS}		±20	V
Continuous drain current(DC)	I_D		170	A
Continuous drain current(Peak)	I_{DP}	Pulse width 10μs, Duty=1/100	510	A
Continuous source current(DC)	Is		170	A
Total power dissipation	P_T	With heatsink	178	W
Total power dissipation	P_T	Measured on the 1 inch² glass epoxy substrate pattern area：636.36㎟	3.7	W
Total power dissipation	P_T	Measured on the 1 inch² glass epoxy substrate pattern area：170.51㎟	3	W
Single avalanche current	I_{AS}	Starting Tch=25℃ Tch≦150℃	64	A
Single avalanche energy	E_{AS}	Starting Tch=25℃ Tch≦150℃	204	mJ

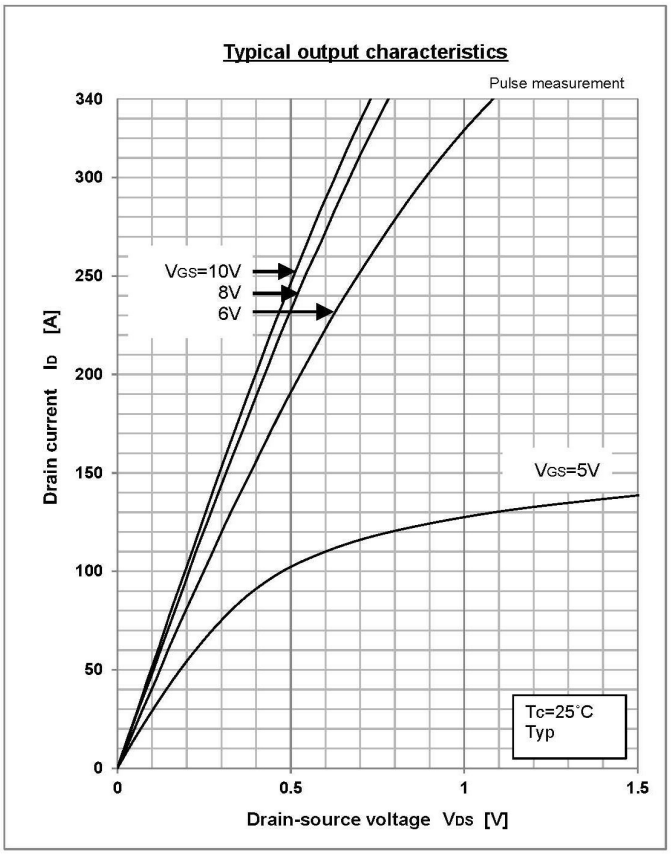
※ ：See the original Specifications

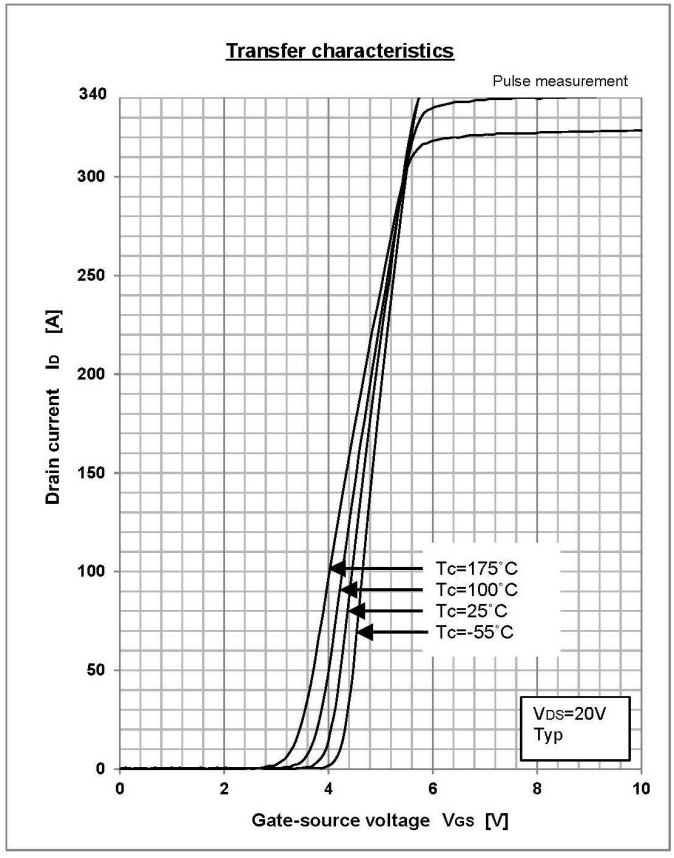
Electrical Characteristics (unless otherwise specified : Tc=25°C)

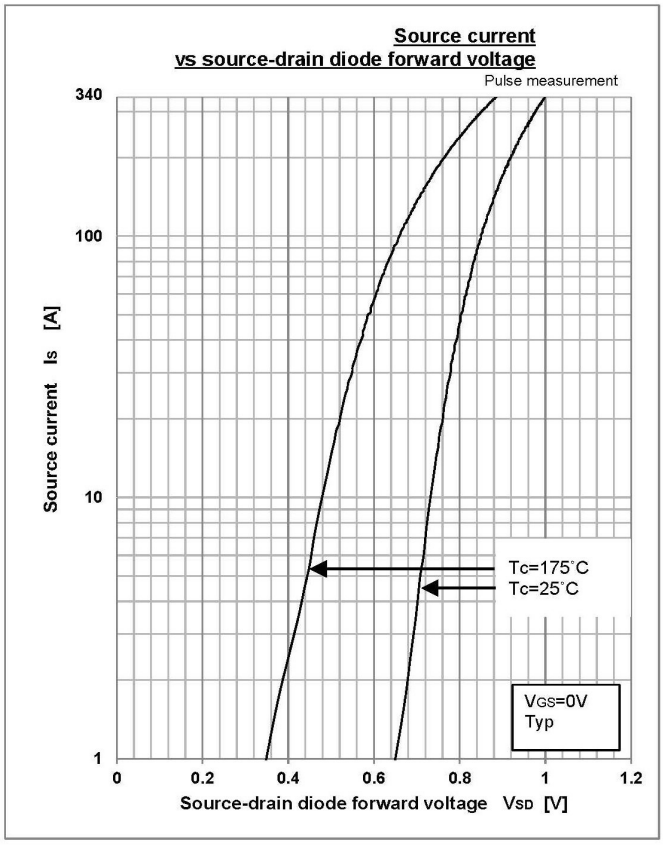
Item	Symbol	Conditions	Ratings			Unit
			MIN	TYP	MAX	
Drain-Source breakdown voltage	$V_{(BR)DSS}$	ID=1mA, VGS=0V	60			V
Zero gate voltage drain current	I_{DSS}	VDS=60V, VGS=0V			10	μA
Gate-source leakage current	I_{GSS}	VGS=±20V, VDS=0V			±0.1	μA
Forward transconductance	g_{fs}	ID=42.5A, VDS=10V	32			S
Static drain-source on-state resistance	$R_{DS(ON)}$	ID=85A, VGS=10V		0.00193	0.0024	Ω
Gate threshold voltage	Vth	ID=1mA, VDS=10V	2	3	4	V
Source-drain diode forward voltage	V_{SD}	IS=85A, VGS=0V			1.2	V
Thermal resistance	Rth(j-c)	Junction to case, With heatsink			0.84	°C/W
Thermal resistance	Rth(j-a)	Junction to ambient, Measured on the 1 inch² glass epoxy substrate pattern area：636.36㎟			40	°C/W
Thermal resistance	Rth(j-a)	Junction to ambient, Measured on the 1 inch² glass epoxy substrate pattern area：170.51㎟			50	°C/W
Total gate charge	Qg	VDS=48V, VGS=10V, ID=85A		130		nC
Gate to source charge	Qgs	VDS=48V, VGS=10V, ID=85A		36		nC
Gate to drain charge	Qgd	VDS=48V, VGS=10V, ID=85A		49		nC
Input capacitance	Ciss	VDS=25V, VGS=0V, f=1MHz		8090		pF
Reverce transfer capacitnce	Crss	VDS=25V, VGS=0V, f=1MHz		370		pF
Output capacitance	Coss	VDS=25V, VGS=0V, f=1MHz		820		pF
Turn-on delay time	td(on)	ID=42.5A, RL=0.71Ω, VDS=30V, Rg=0Ω, +VGS=10V, -VGS=0V		13		ns
Rise time	tr	ID=42.5A, RL=0.71Ω, VDS=30V, Rg=0Ω, +VGS=10V, -VGS=0V		38		ns
Turn-off delay time	td(off)	ID=42.5A, RL=0.71Ω, VDS=30V, Rg=0Ω, +VGS=10V, -VGS=0V		104		ns
Fall time	tf	ID=42.5A, RL=0.71Ω, VDS=30V, Rg=0Ω, +VGS=10V, -VGS=0V		40		ns
Diode reverse recovery time	trr	IS=85A, VGS=0V, -di/dt=100A/μs		51		ns
Diode reverse recovery charge	Qrr	IS=85A, VGS=0V, -di/dt=100A/μs		85		nC

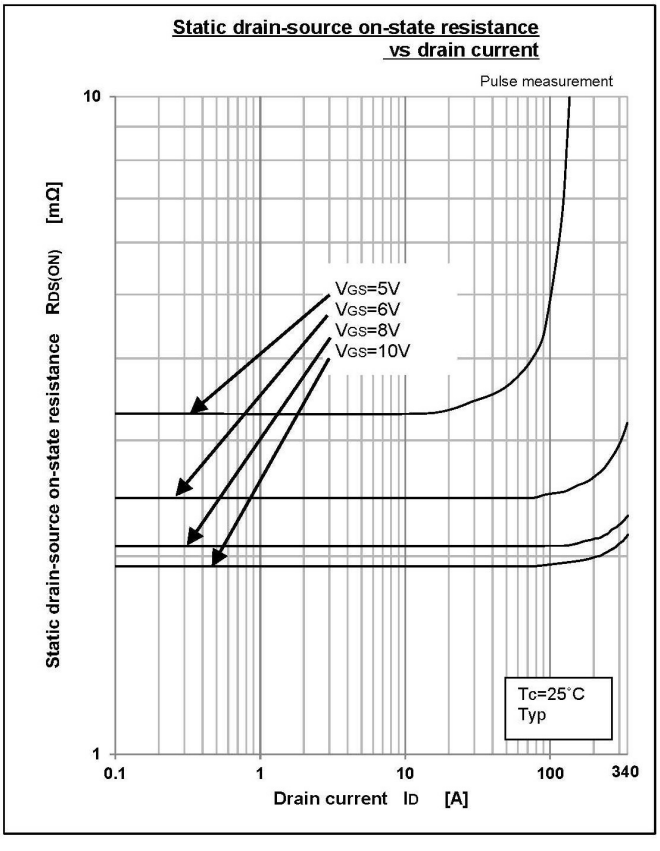
※ ：See the original Specifications

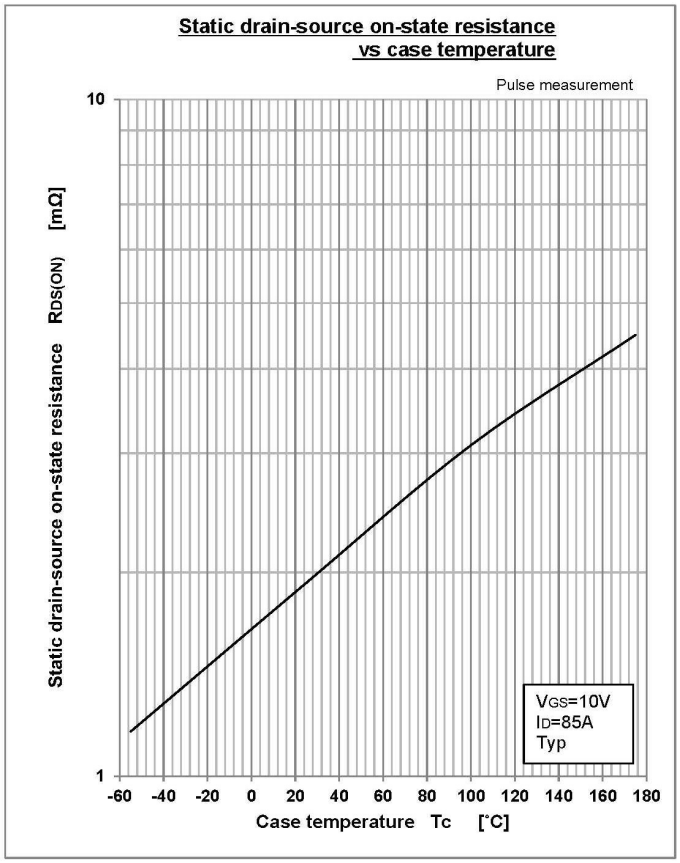
CHARACTERISTIC DIAGRAMS

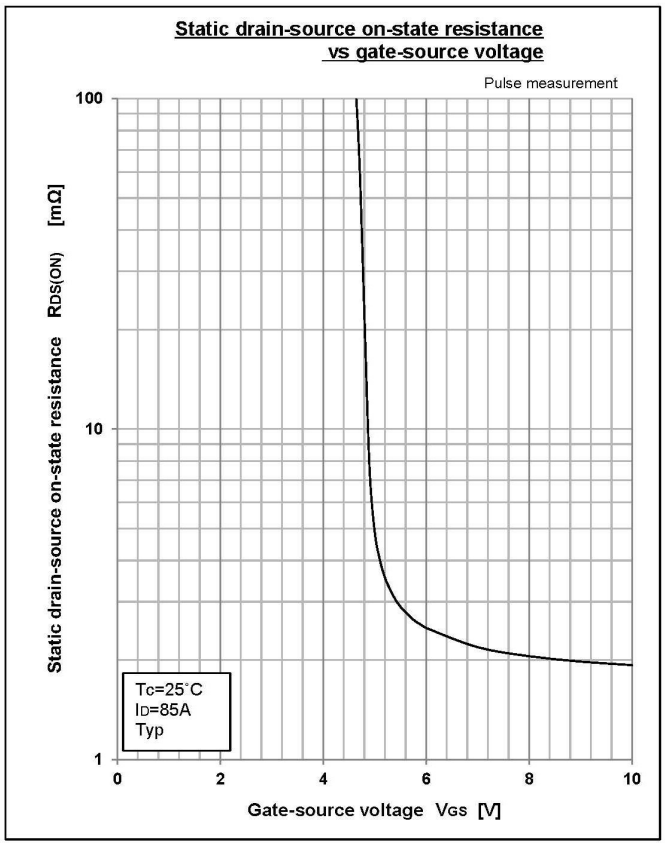


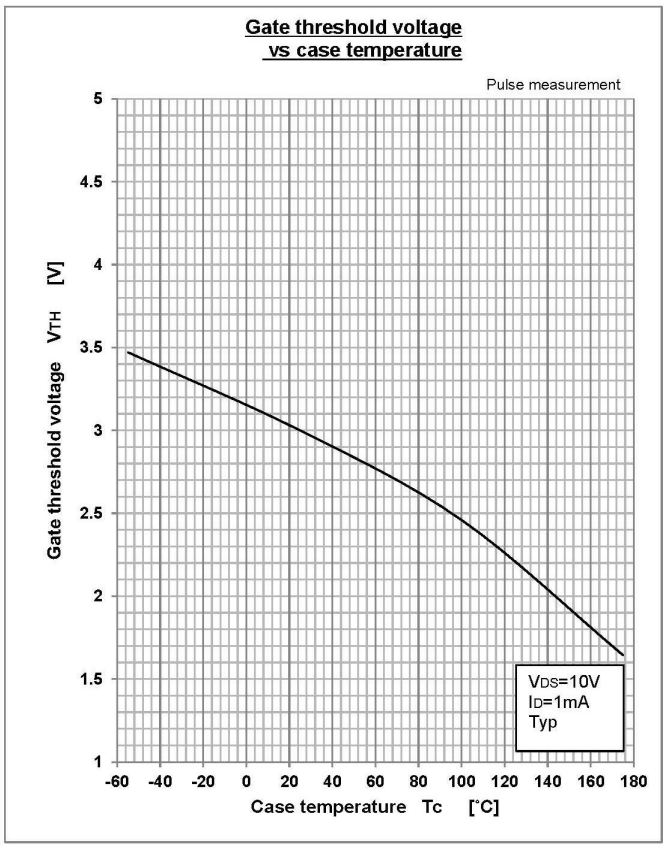


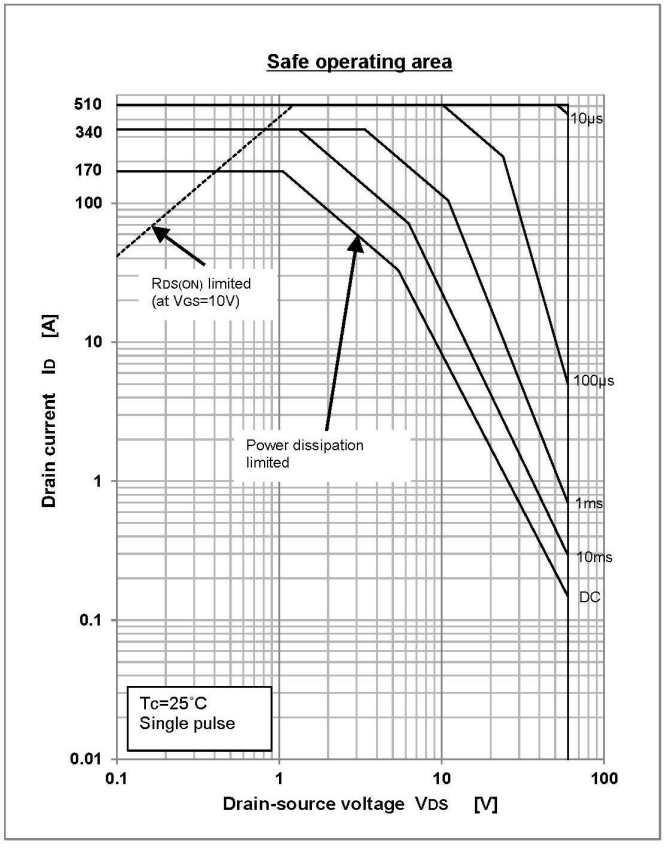


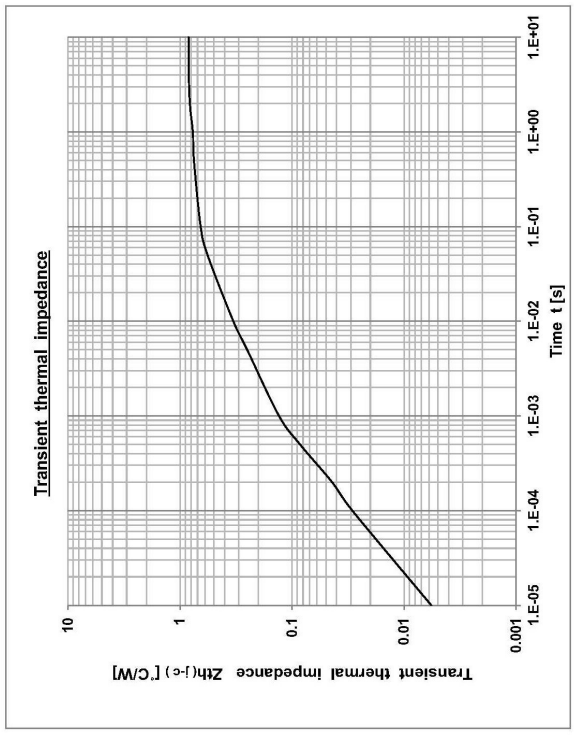



Static drain-source on-state resistance
vs case temperature
Pulse measurement
Static drain-source on-state resistance RDS(ON) [mΩ]
10
1
-60 -40 -20 0 20 40 60 80 100 120 140 160 180
Case temperature Tc [°C]
VGS=10V
ID=85A
Typ

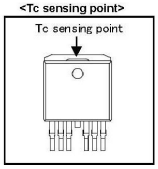

Static drain-source on-state resistance
vs gate-source voltage
Pulse measurement
Static drain-source on-state resistance RDS(ON) [mΩ]
100
10
1
0 2 4 6 8 10
Gate-source voltage VGS [V]
Tc=25°C
ID=85A
Typ

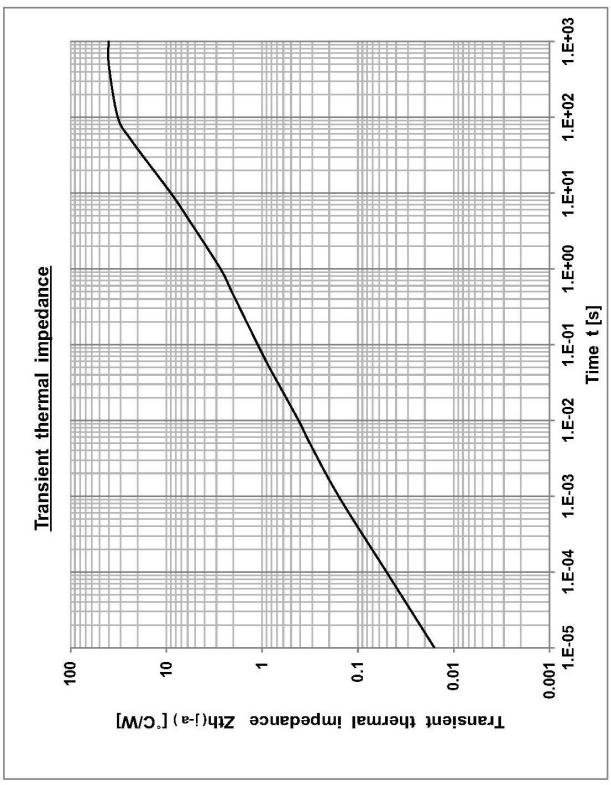

Gate threshold voltage
vs case temperature
Pulse measurement
Gate threshold voltage VTH [V]
5
4.5
4
3.5
3
2.5
2
1.5
1
-60 -40 -20 0 20 40 60 80 100 120 140 160 180
Case temperature Tc [°C]
VDS=10V
ID=1mA
Typ


Safe operating area
Drain current ID [A]
510
340
170
100
10
1
0.1
0.01
0.1 1 10 100
Drain-source voltage VDS [V]
10μs
100μs
1ms
10ms
DC
RDS(ON) limited
(at VGS=10V)
Power dissipation
limited
Tc=25°C
Single pulse



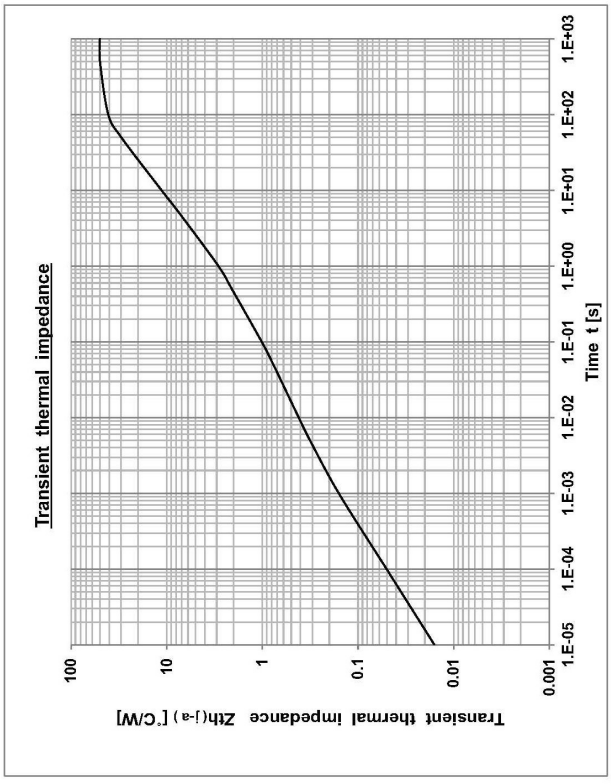
<Tc sensing point>





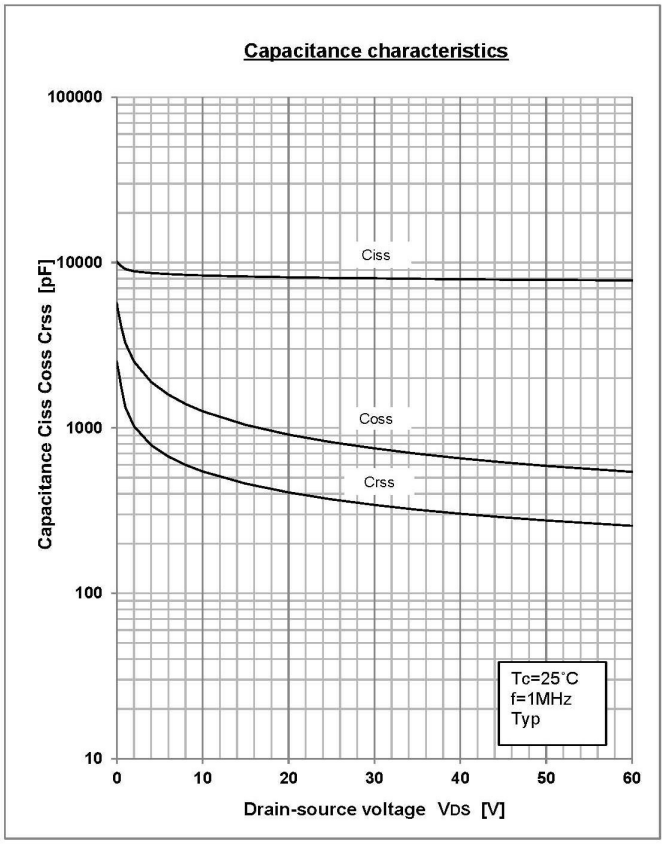
<Substrate detail>

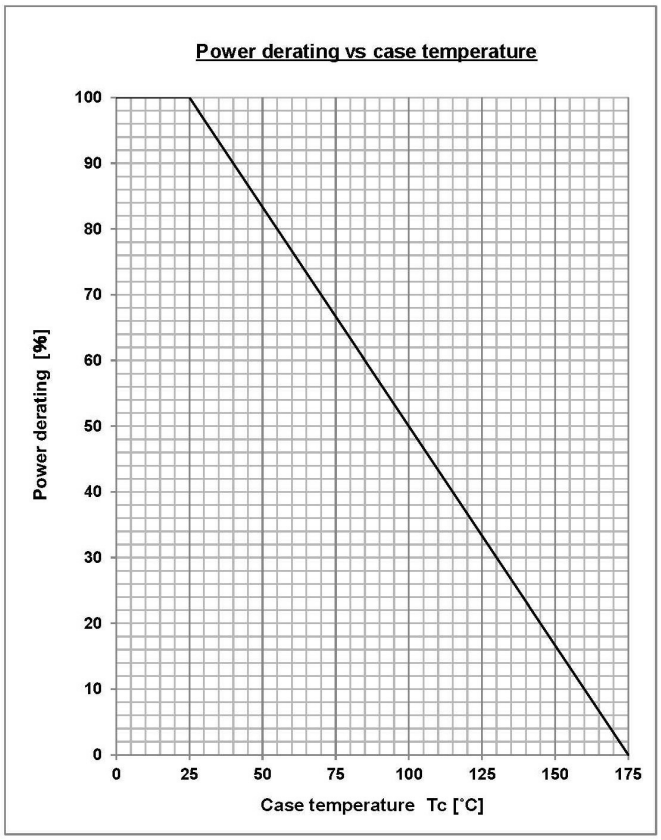
Type	Glass-epoxy
Size	1 inch^2
Thickness	1.6 mm
Conductor thickness	70 µm
Pattern area	636.36 mm^2

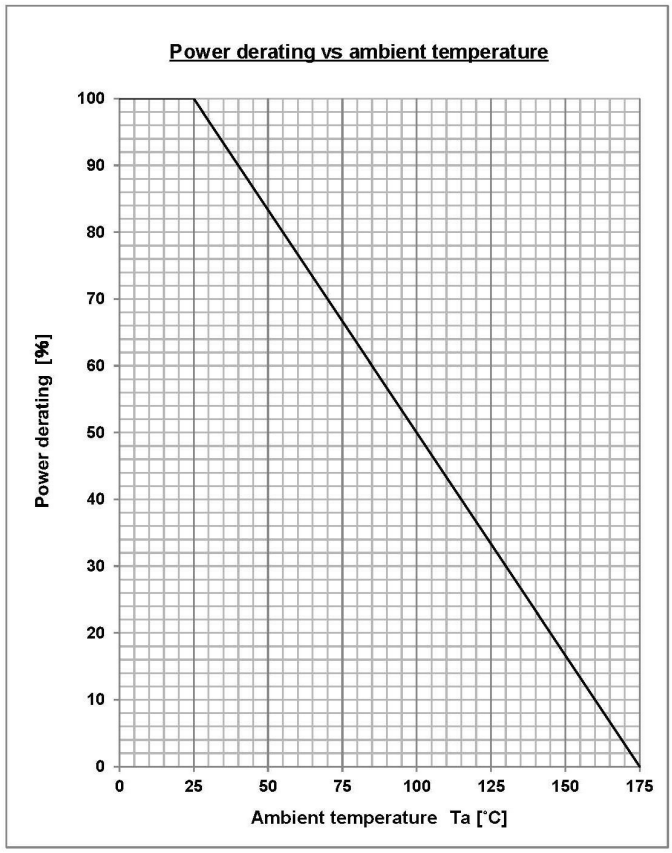


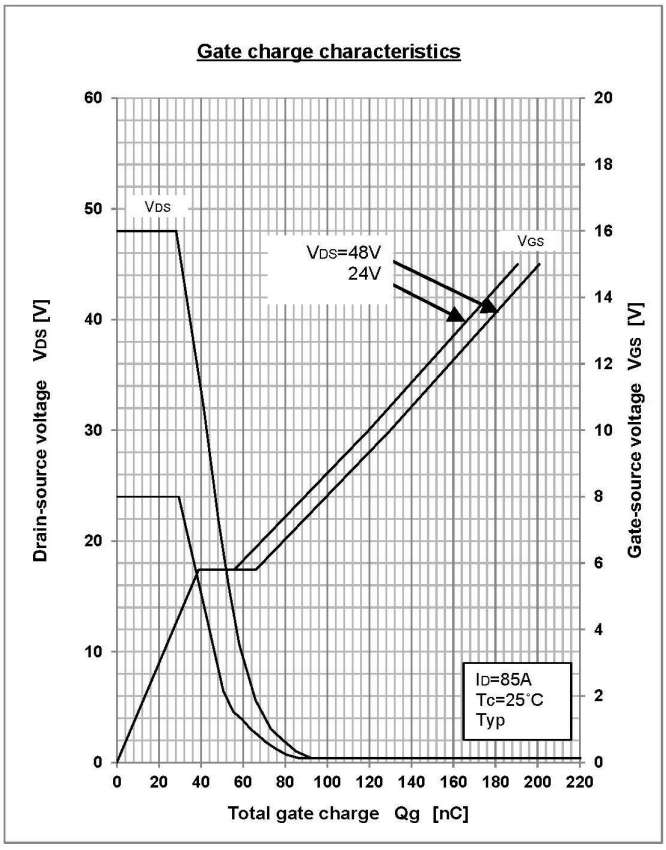
<Substrate detail>

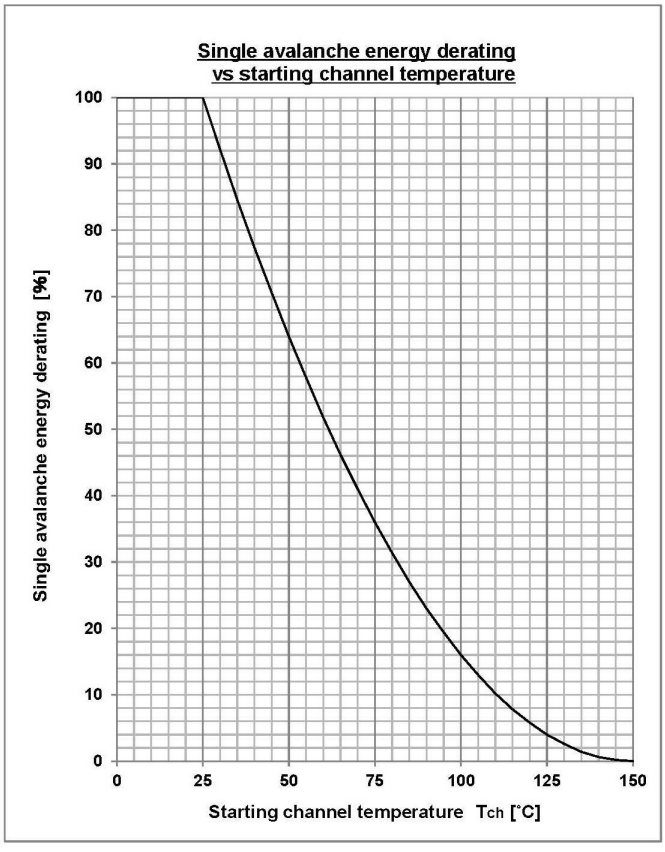
Type	Glass-epoxy
Size	1 inch^2
Thickness	1.6 mm
Conductor thickness	70 µm
Pattern area	170.51 mm^2




Power derating vs case temperature
Power derating [%]
Case temperature Tc [°C]
0
10
20
30
40
50
60
70
80
90
100
0
25
50
75
100
125
150
175


Power derating vs ambient temperature
Power derating [%]
Ambient temperature Ta [°C]
0
10
20
30
40
50
60
70
80
90
100
0
25
50
75
100
125
150
175


Gate charge characteristics
Drain-source voltage VDS [V]
Gate-source voltage VGS [V]
Total gate charge Qg [nC]
VDS
VDS=48V
24V
VGS
ID=85A
Tc=25°C
Typ
0
10
20
30
40
50
60
0
2
4
6
8
10
12
14
16
18
20
0
20
40
60
80
100
120
140
160
180
200
220

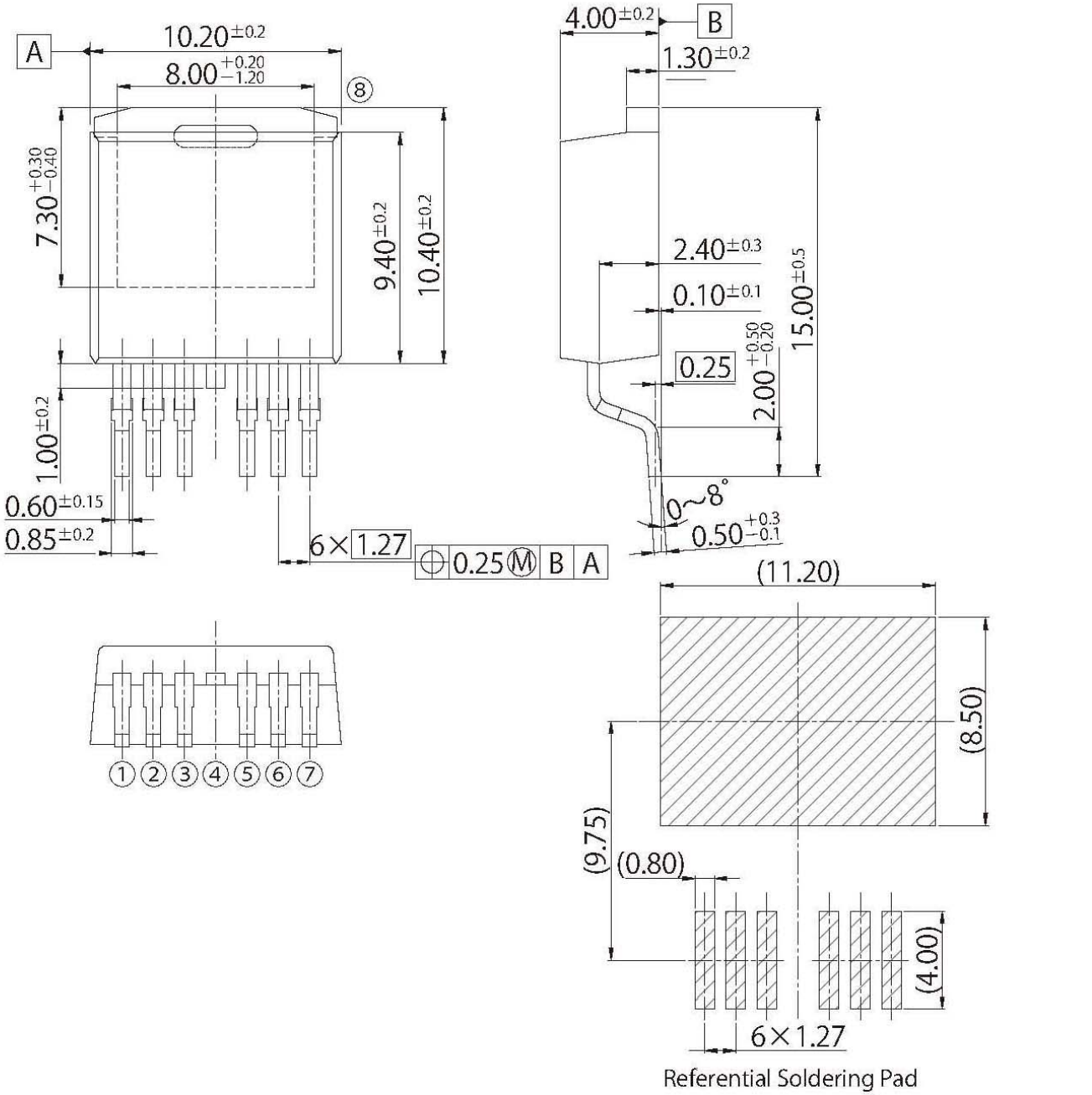

Single avalanche energy derating
vs starting channel temperature
Single avalanche energy derating [%]
Starting channel temperature Tch [°C]
0
10
20
30
40
50
60
70
80
90
100
0
25
50
75
100
125
150

Outline Dimensions

unit:mm

H7

JEDEC Code	TO-263SC
JEITA Code	–
House Name	FZ-7p



• Optimize soldering pad to the board design and soldering condition

Notes

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