SHENZHEN SINO-IC

Semiconductor Co., Ltd.

SE13N50

N-Channel Enhancement-Mode MOSFET

Revision: A

General Description

Thigh Density Cell Design For Ultra Low On-Resistance Fully Characterized Avalanche Voltage and Current Improved Shoot-Through FOM

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

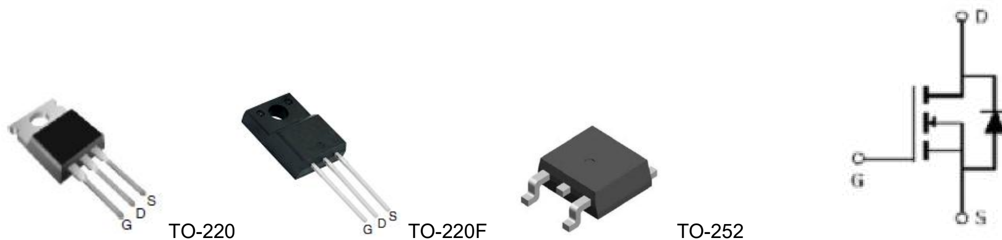
Features

For a single MOSFET

- V_{DS} = 500V
- $R_{DS(ON)}$ = 0.38Ω @ V_{GS}=10V

Pin configurations

See Diagram below



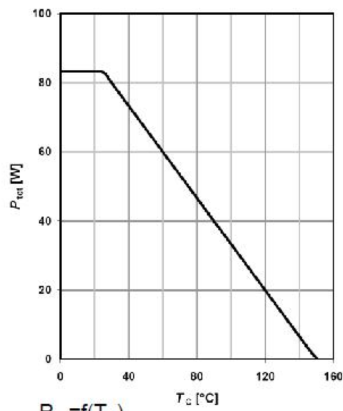
Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	500	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current	Continuous	I_D	13	A
	Pulsed		36	
Avalanche energy, single pulse	I_D=2.2A,V_{DD}=50V	E_{AS}	210	mJ
Avalanche current, repetitive		I_{AR}	1.8	A
Total Power Dissipation	@TA=25℃	P_D	83	W
Operating Junction Temperature Range		T_J	-55 to 150	℃

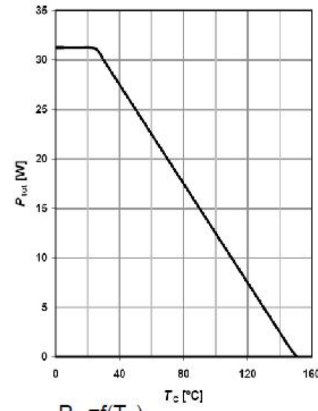
Electrical Characteristics (TJ=25℃ unless otherwise noted)						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ**	**Max**	**Units**
OFF CHARACTERISTICS (Note 2)						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0 V	500			V
I_{DSS}	Drain to Source Leakage Current	V_{DS}=500V, V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=30 V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	2.5		4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V, I_D=5.5A		0.38	0.47	Ω
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		680		pF
C_{oss}	Output Capacitance			240		pF
C_{rss}	Reverse Transfer Capacitance			7		pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge [2]	V_{GS}=10V, V_{DS}=480V, I_D=5.5A		38		nC
Q_{gs}	Gate Source Charge			4		nC
Q_{gd}	Gate Drain Charge			4.2		nC
$t_{d(on)}$	Turn-On Delay Time	V_{GS}=10V, V_{DS}=400V, R_{GEN}=7.5Ω, I_D=11A		15		ns
$t_{d(off)}$	Turn-Off Delay Time			110		ns
$t_{d(r)}$	Turn-On Rise Time			10		ns
$t_{d(f)}$	Turn-Off Fall Time			9		ns

Thermal Resistance				
Symbol	**Parameter**	**Min**	**Typ**	**Units**
$R_{\theta JC}$	Junction to Case		3.7	℃/W
$R_{\theta JA}$	Junction to Ambient (t≦10s)		80	℃/W

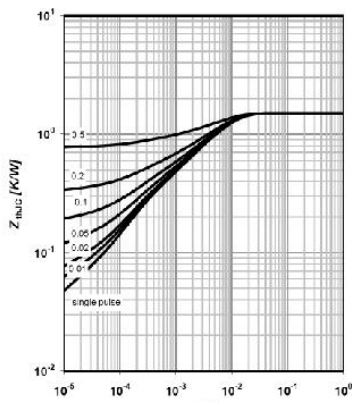
Typical Characteristics



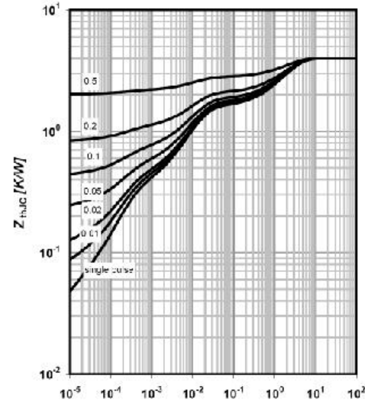
P_{tot}=f(T_C)
Power dissipation TO-220,TO-252,TO-263,To-262



P_{tot}=f(T_C)
Power dissipation TO-220FullPAK



$Z_{(thJC)}$=f(tp);Parameter: D=t_p/T
Max. Transient thermal impedance TO-220,TO-252,TO-263,To-262



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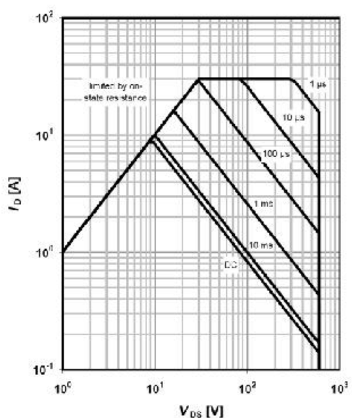
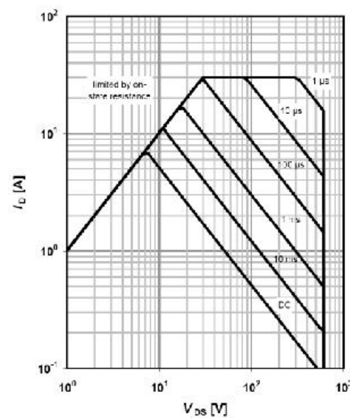


I_D=f(V_{DS}); Tc=25°C; D=0 parameter t_p
Safe Operating area Tc=25°C TO-220,TO-252,TO-263,To-262



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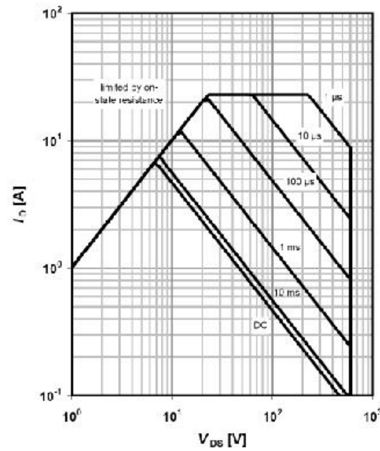
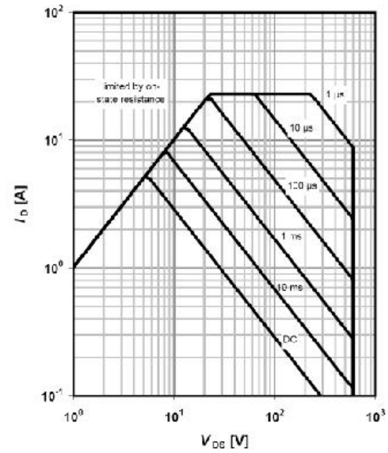


I_D=f(V_{DS}); Tc=80℃; D=0 parameter t_p
Safe Operating area Tc=80℃ TO-220,TO-252,TO-263,To-262



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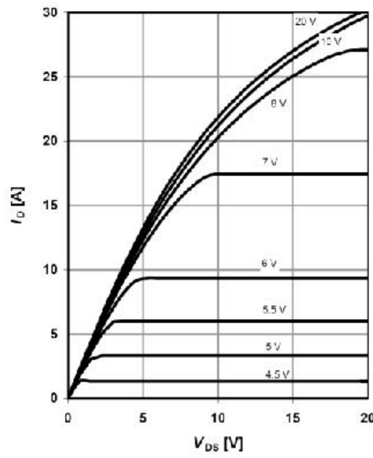
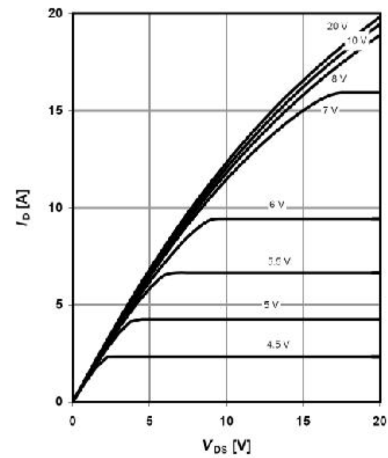
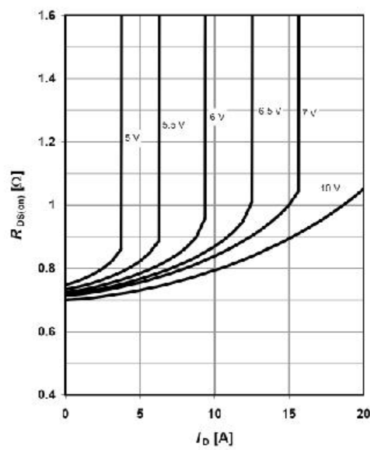
Safe Operating area Tc=80℃ TO-220FullPAK



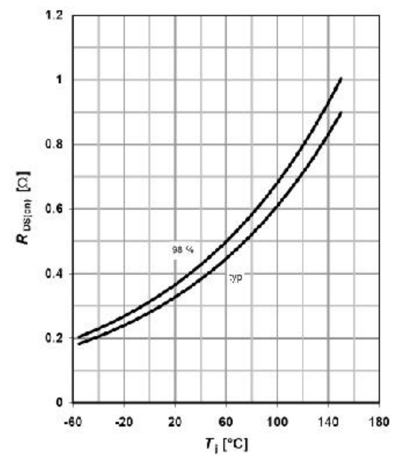
I_D=f(VDS); T_j=25℃； parameter: V_{GS}
Typ. Output characteristics T_j=25 ℃



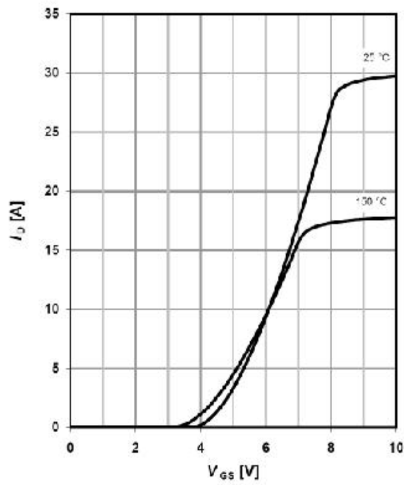
I_D=f(VDS); T_j=125℃； parameter: V_{GS}
Typ. Output characteristics T_j=125 ℃



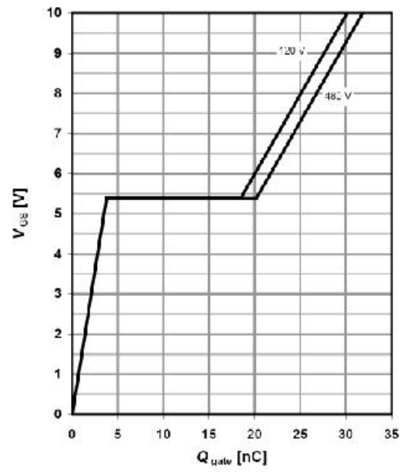
$R_{DS(on)}$=f(I_D); T_j=125℃; parameter: V_{GS}
Typ. Drain-source on-state resistance



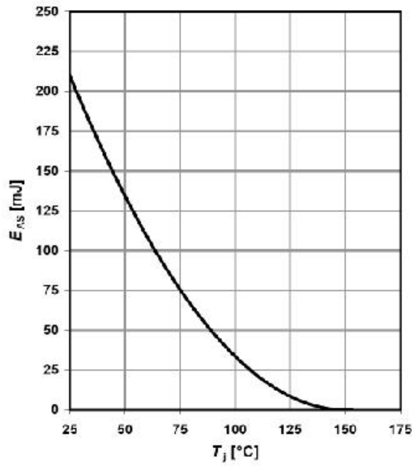
$R_{DS(on)}$=f(T_j); I_D=3.8A; V_{GS}=10V
Drain-source on-state resistance



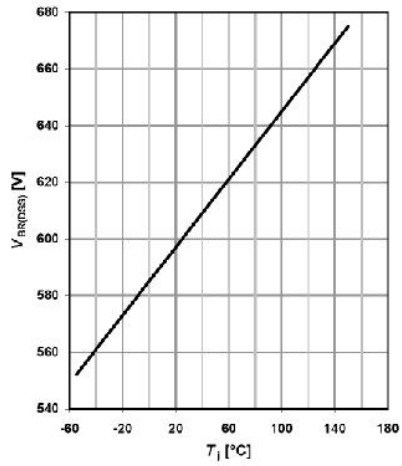
$I_D=f(V_{GS})$; $V_{DS}=20V$
Typ. Transfer characteristics



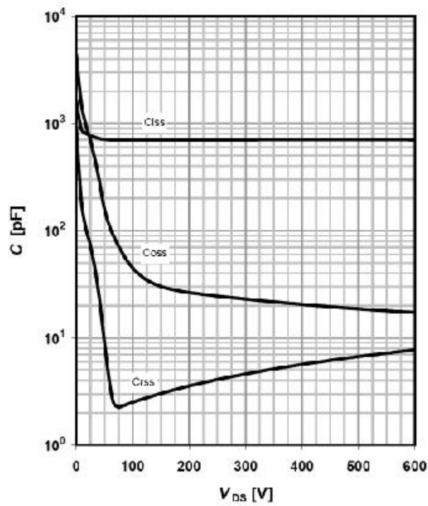
$V_{GS}=f(Q_{gate})$; $I_D=4.8A$ pulsed
Typ. Gate charge



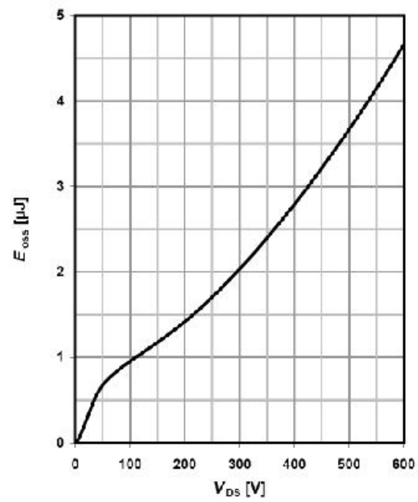
$E_{AS}=f(T_j)$; $I_D=1.8A$; $V_{DD}=50V$
Avalanche energy



$V_{BR(DSS)}=f(T_j)$; $I_D=250uA$
Drain-source break down voltage



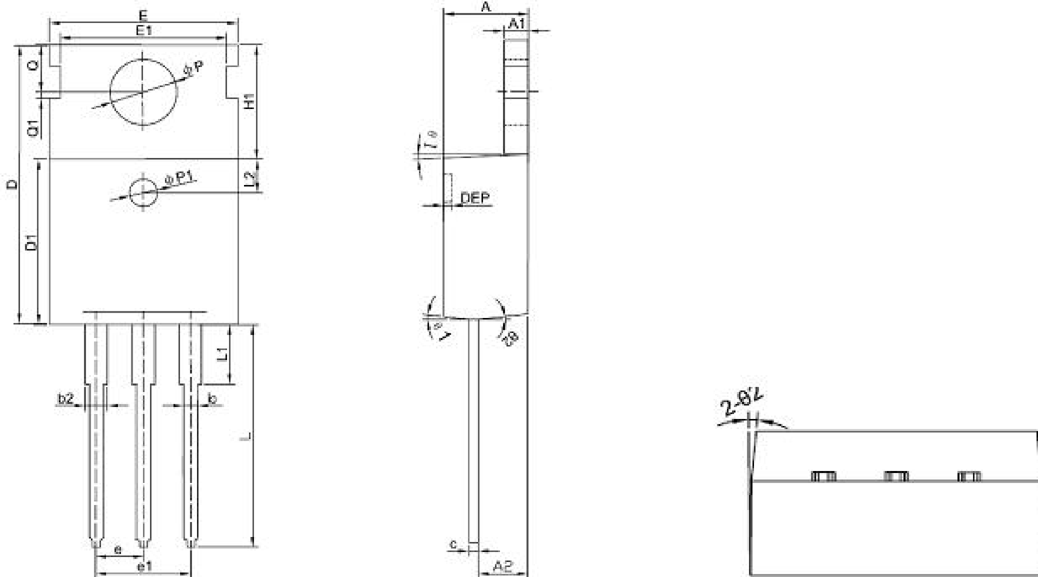
$C=f(V_{DS})$; $V_{GS}=0V$ f=1MHz
Typ. Capacitances



$E_{oss}=f(V_{DS})$
Typ. C_{oss} Store energy

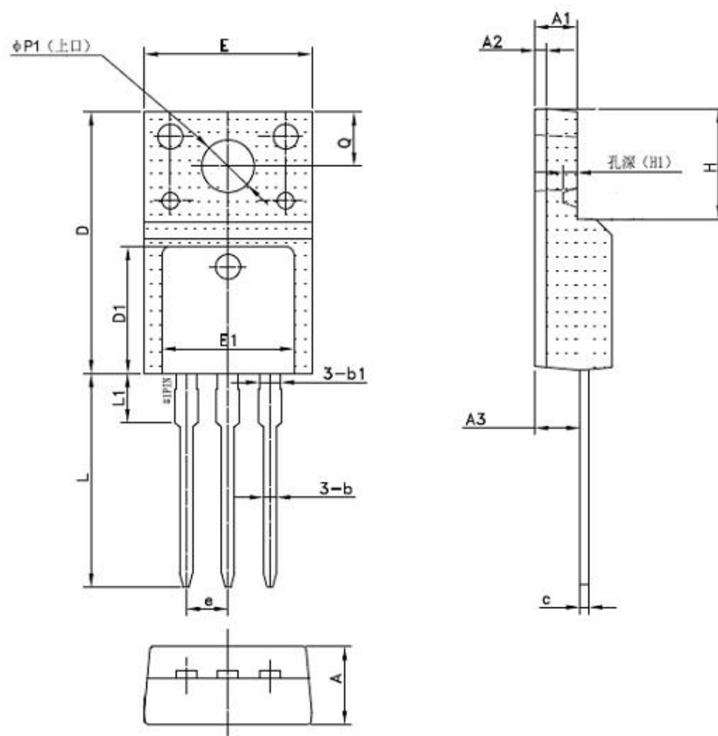
Package Outline Dimension

TO-220



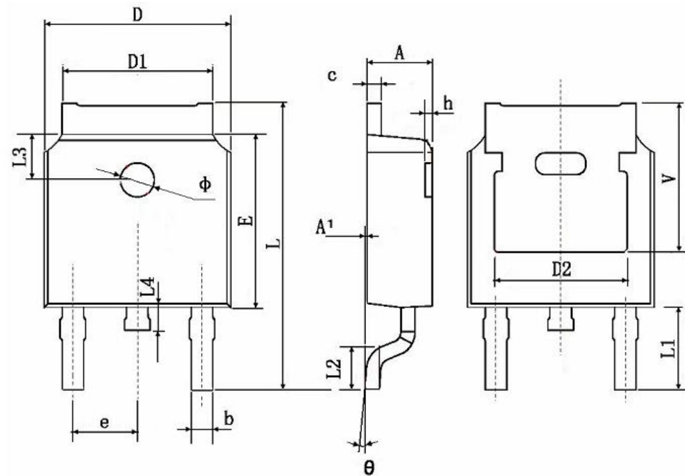
Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.400	4.550	4.700	0.173	0.179	0.185
A1	1.270	1.300	1.330	0.050	0.051	0.052
A2	2.590	2.690	2.790	0.102	0.106	0.110
b	0.770	-	0.900	0.030	-	0.035
b2	1.230	-	1.360	0.048	-	0.054
c	0.480	0.500	0.520	0.019	0.020	0.020
D	15.100	15.400	15.700	-	0.606	-
D1	9.000	9.100	9.200	0.354	0.358	0.362
DEP	0.050	0.285	0.520	0.002	0.011	0.020
E	10.060	10.160	10.260	0.396	0.400	0.404
E1	-	8.700	-	-	0.343	-
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.100	6.300	6.500	0.240	0.248	0.256
L	12.750	12.960	13.170	0.502	0.510	0.519
L1	-	-	3.950	-	-	0.156
L2	1.85REF			0.073REF		
ΦP	3.570	3.600	3.630	0.141	0.142	0.143
Q	2.730	2.800	2.870	0.107	0.110	0.113
Q1	-	0.200	-	-	0.008	-
Θ1	5^0	7^0	9^0	5^0	7^0	9^0
Θ2	1^0	3^0	5^0	1^0	3^0	5^0

TO-220F



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.50	4.70	4.90
A1	2.44	2.54	2.64
A2	0.60	0.70	0.80
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1	-	1.28	-
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e		2.54(BSC)	
H	6.50	6.70	6.90
(H1)	-	(0.81)	-
L	12.48	12.98	13.20
L1	-	2.93	-
ΦP1	2.98	3.18	3.38
Q	3.10	3.30	3.50

TO-252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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