SHANGHAI SINO-IC
MICROELECTRONICS CO., LTD.

Oct 2014

SE4N65

N-Channel Enhancement-Mode MOSFET

Revision: A

General Description

This series is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics
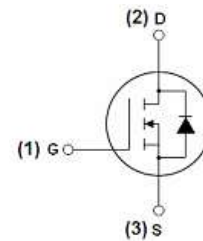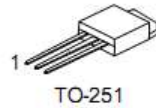
Features

For a single MOSFET

- V_{DS} = 650V
- $R_{DS(ON)}$ = 2.224Ω @ V_{GS}=10V

Pin configurations

See Diagram below

Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current	Continuous	I_D	4.0	A
	Pulsed		16	
Power Dissipation		P_D	23.1	W
Operating Junction Temperature Range		T_J	-55 to 150	℃

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction to Ambient (t ≦ 10s)		62.5	℃/W

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| 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	V_{GS}=0 V, I_D=250µA,	650			V
I_{DSS}	Drain to Source Leakage Current	V_{DS}=650V, V_{GS}=0V			1	µA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=30V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA	2.0		4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V, I_D=2.2A		2.224	2.6	Ω
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		520	680	pF
C_{oss}	Output Capacitance			60	80	pF
C_{rss}	Reverse Transfer Capacitance			8	10.5	pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge [2]	V_{GS}=10V, V_{DS}=520V, I_D=4.2A		10.5	13.5	nC
Q_{gs}	Gate Source Charge			2.5		nC
Q_{gd}	Gate Drain Charge			4.0		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=325V, R_{GEN}=25Ω I_D=4.2A		11	33	ns
$t_{d(off)}$	Turn-Off Delay Time			45	90	ns
$t_{d(r)}$	Turn-On Rise Time			40	88	ns
$t_{d(f)}$	Turn-Off Fall Time			48	100	ns
Source-Drain Diode Characteristics						
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V,I_S=4.4A			1.4	V
I_S	Max Drain-Source Diode Current				4.2	A
I_{SM}	Max Pulse Drain-Source Current				16.8	A
t_{rr}	Reverse Recovery Time	VGS=0V,IS=4.4A dI_F/dt=100A/µs[1]		300		ns
Q_{RR}	Reverse Recovery Charge			2.2		µC

Typical Characteristics
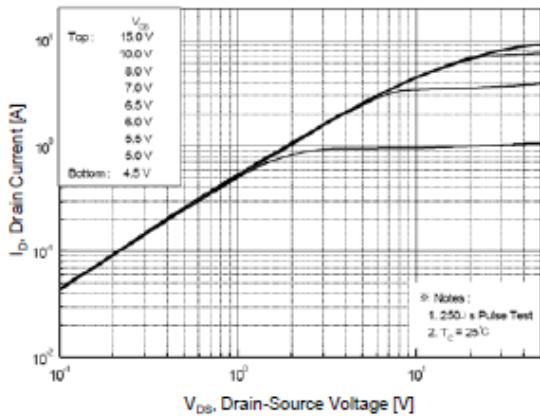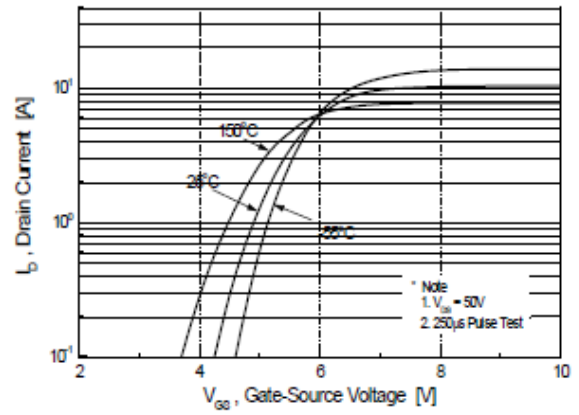

Figure 1. On Region Characteristics

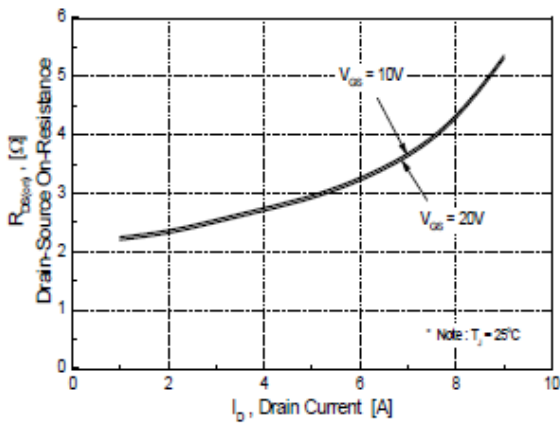Figure 2. Transfer Characteristics

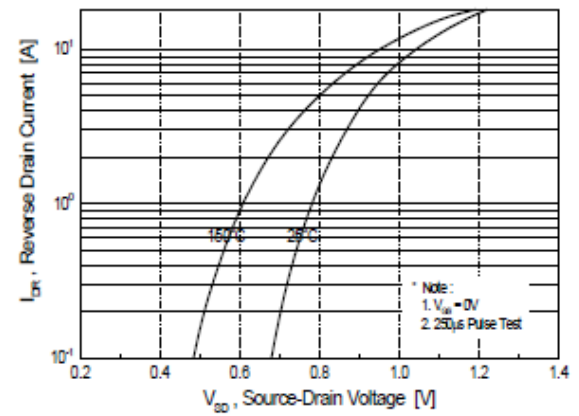Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature
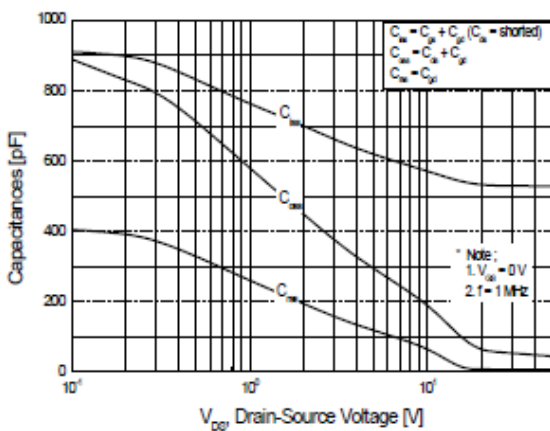

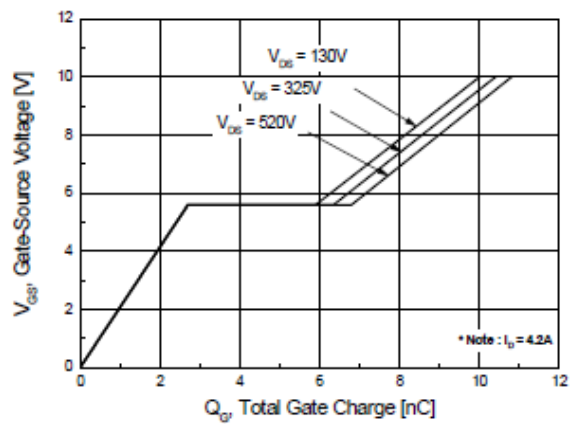Figure 5. Capacitance Characteristics

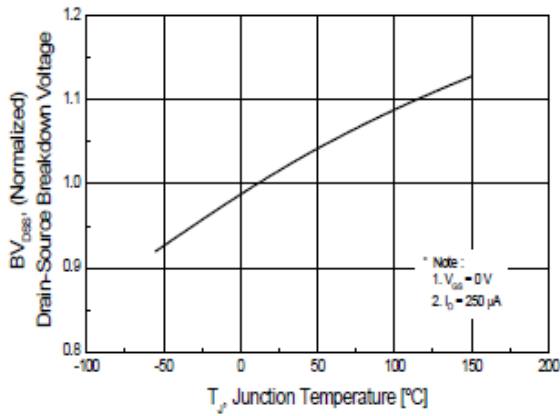Figure 6. Gate Charge Characteristics

Figure 7. Breakdown Voltage Variation
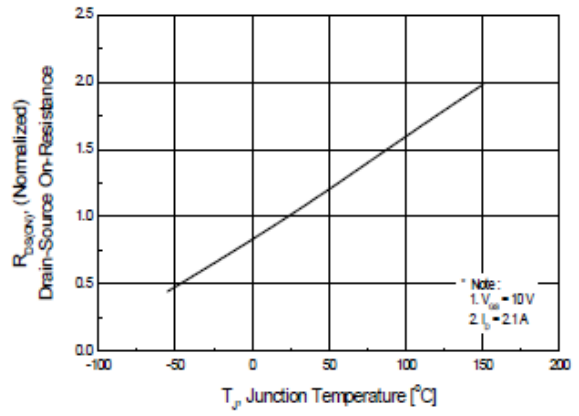vs Temperature

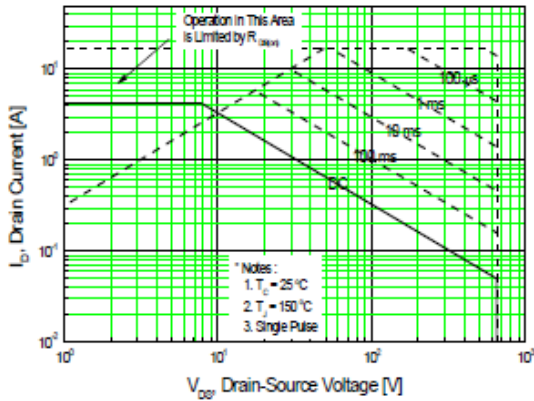Figure 8. On-Resistance Variation
vs Temperature

Figure 9. Maximum Safe Operating Area

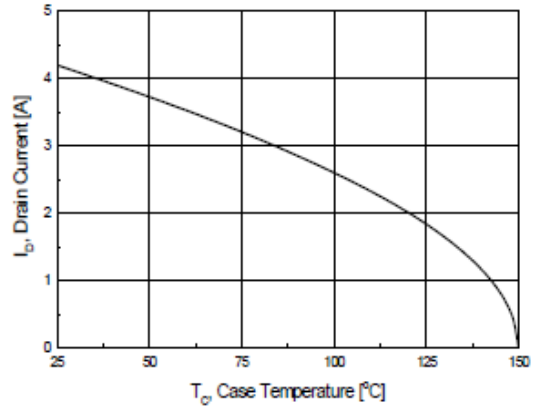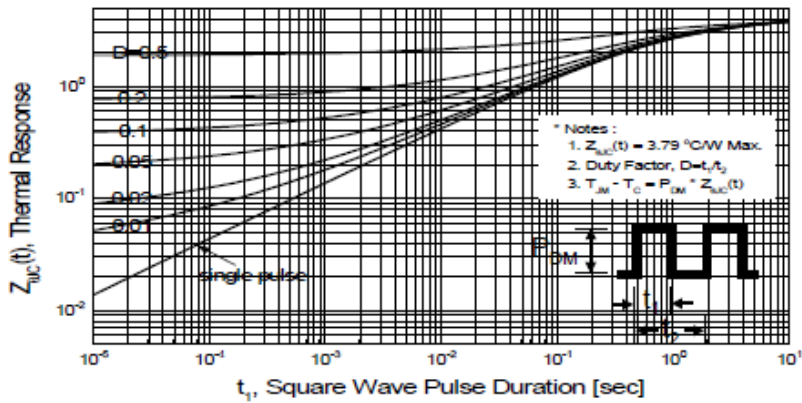

Figure 10. Maximum Drain Current
vs Case Temperature

Figure 11. Transient Thermal Response Curve

Package Outline Dimension

TO-220F
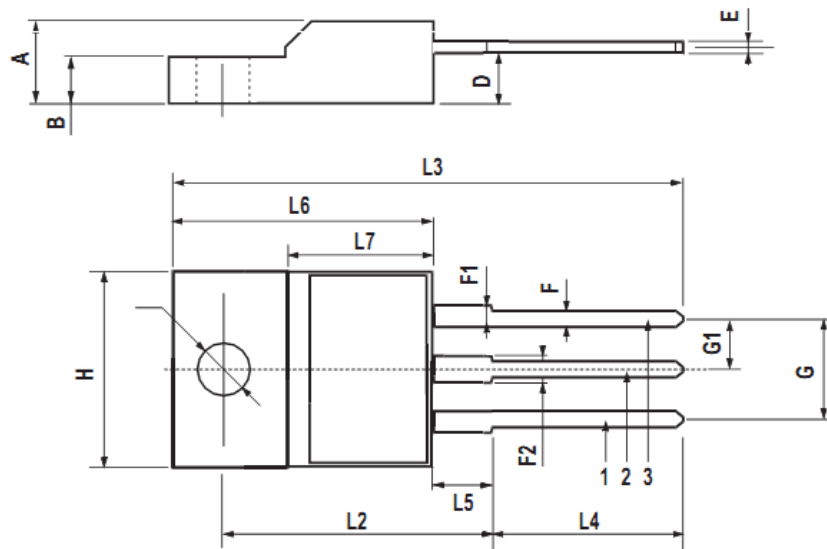
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.5	0.045		0.067
F2	1.15		1.5	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126

Package Outline Dimension

TO-252
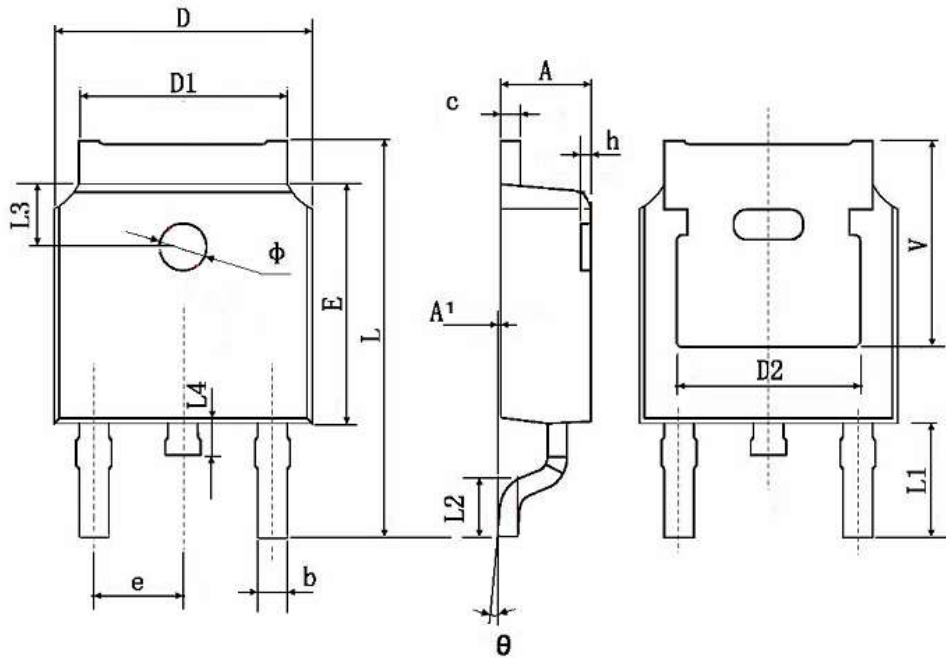
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	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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Package Outline Dimension

TO-251
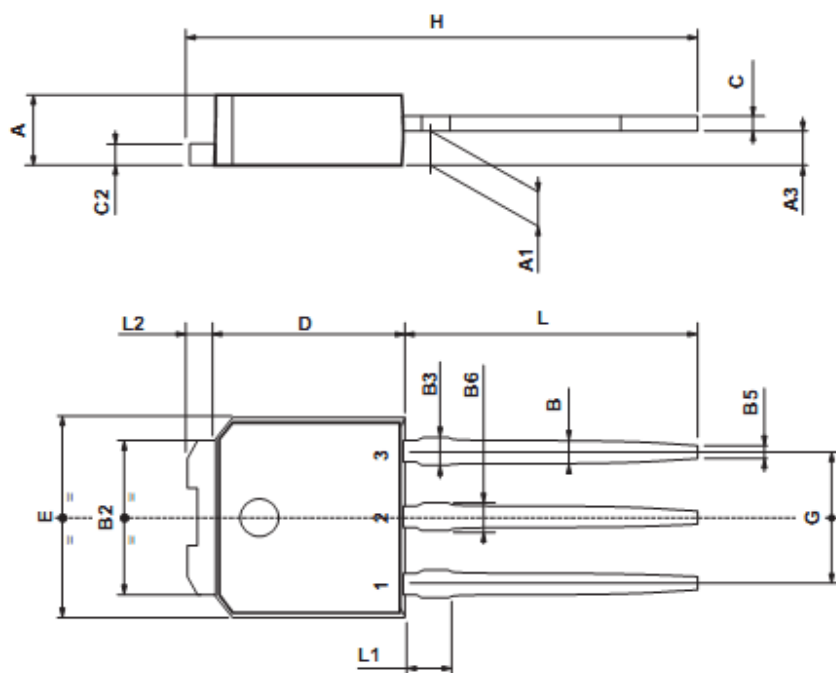
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039

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