SHANGHAI SINO-IC MICROELECTRONICS CO., LTD.

Apr 2014

SE4020B

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

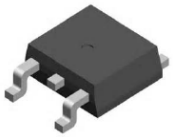
Features

For a single MOSFET

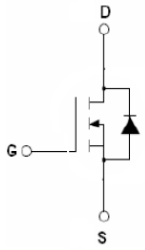
- V_{DS} = 40V
- $R_{DS(ON)}$ = 15mΩ @ V_{GS}=10V

Pin configurations

See Diagram below



TO-252



Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	Continuous	I_D	20	A
	Pulsed[1]		40	
Total Power Dissipation	@TA=25℃	P_D	20	W
Single Pulse Avalanche Energy[2]		EAS	22	mJ
Avalanche Current@L=0.3mH		IAR	10	A
Operating Junction Temperature Range		T_J	-55 to 175	℃

Thermal Resistance

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction to Case	-	7.5	℃/W

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	40			V
I_{DSS}	Drain to Source Leakage Current	V_{DS}= 40V, V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=20V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	1		2	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=5A	-	15	23	mΩ
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, f=1MHz		410		pF
C_{oss}	Output Capacitance			95		pF
C_{rss}	Reverse Transfer Capacitance			35		pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge [2]	V_{GS}=10V, V_{DS}=20V, I_D=12A		9.5		nC
Q_{gs}	Gate Source Charge			4.5		nC
Q_{gd}	Gate Drain Charge			1.5		nC
$t_{d(on)}$	Turn-On Delay Time	V_{GS}=10V, V_{DS}=20V, R_{GEN}=1.7Ω I_D=12A		3.5		ns
$t_{d(off)}$	Turn-Off Delay Time			13.5		ns
$t_{d(r)}$	Turn-On Rise Time			6		ns
$t_{d(f)}$	Turn-Off Fall Time			3.5		ns
Source-Drain Diode						
Symbol	**Parameter**	**Test Condition**	**Min**	**Typ**	**Max**	**Units**
I_S	Source Current	IF=1A, VDD=20V, dI/dt=100A/μs			12	A
VSD	Diode Forward Voltage			0.75	1.0	V
trr	Reverse Recovery Time	IF=12A, VDD=20V, dI/dt=100A/μs		23		ns
Qrr	Reverse Recovery Charge			18.5		nC

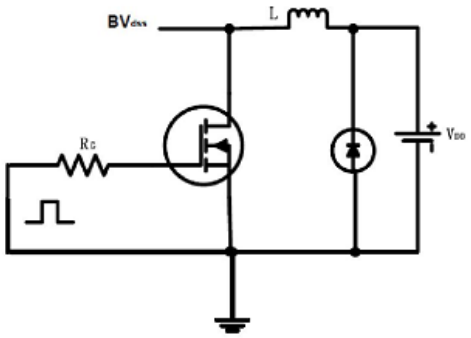
Note 1: Repetitive rating: pulse width limited by max. junction temperature

Note 2: Limited by TJmax, starting TJ=25℃, L=0.3mH, RG=50Ω, IAS=82A, VGS=10V.

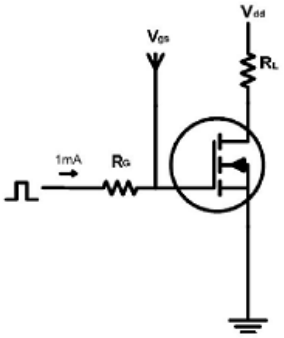
Note 3: Pulse width < 1.0ms; duty cycle<2%.

Test Circuits and Waveform

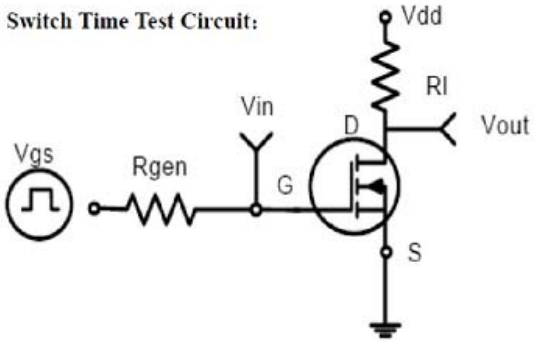
EAS test circuits:



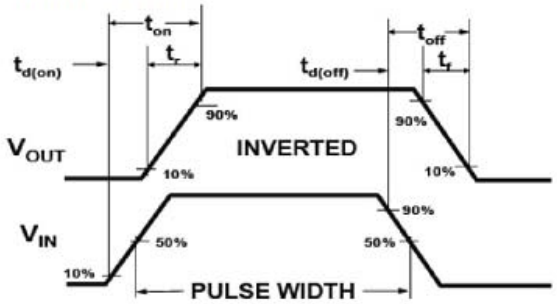
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Typical Characteristics

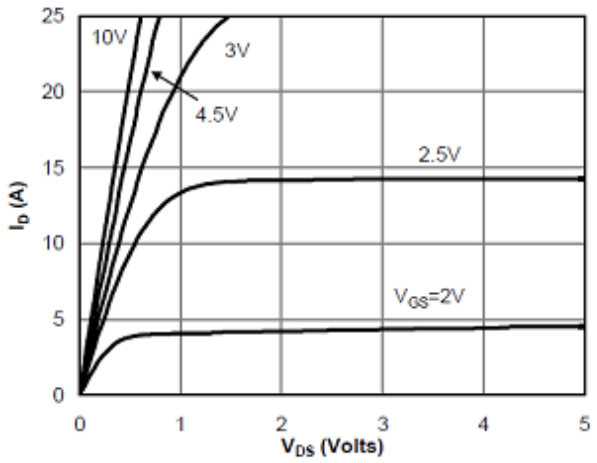


Fig 1: On-Region Characteristics

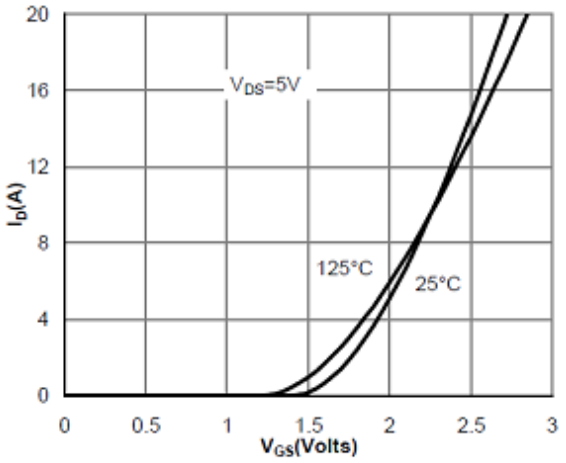


Figure 2: Transfer Characteristics

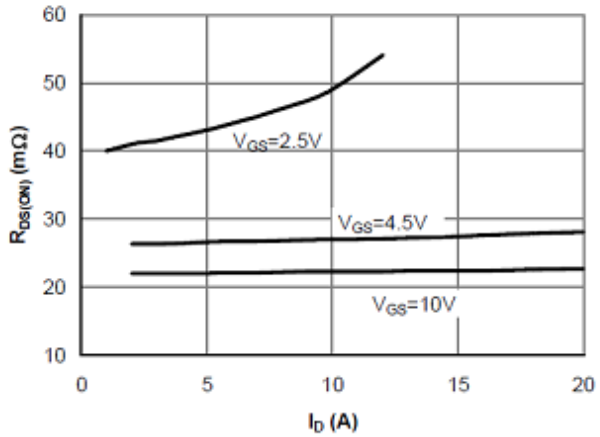


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

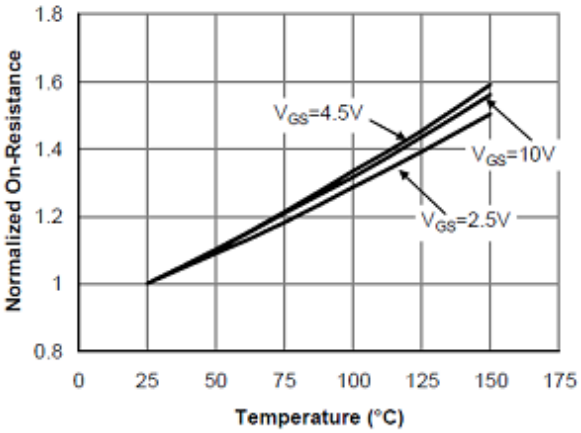


Figure 4: On-Resistance vs. Junction Temperature

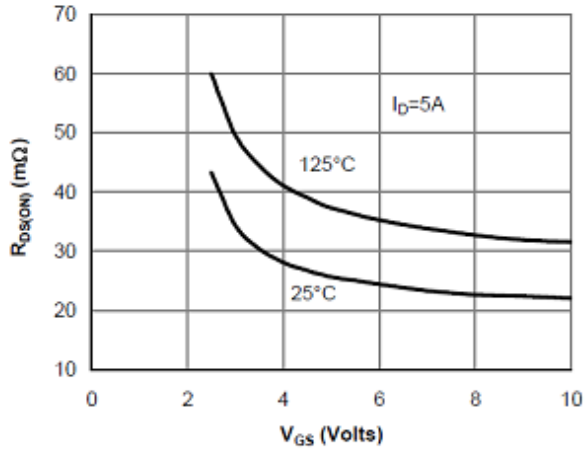


Figure 5: On-Resistance vs. Gate-Source Voltage

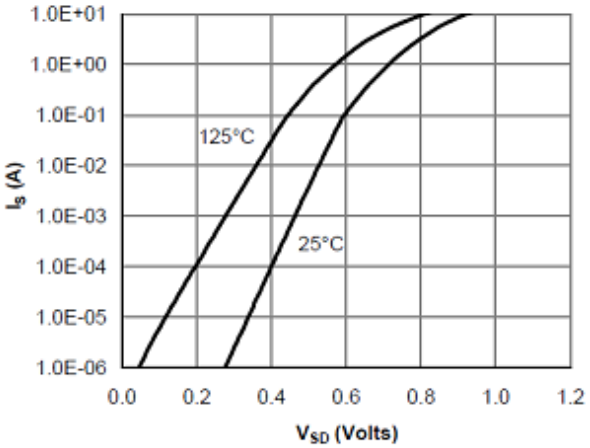


Figure 6: Body-Diode Characteristics

Typical Characteristics

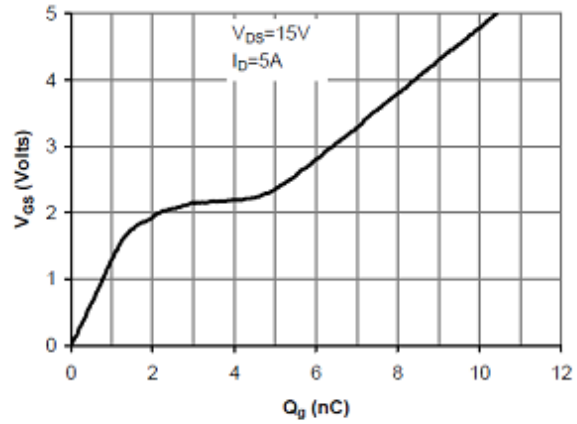


Figure 7: Gate-Charge Characteristics

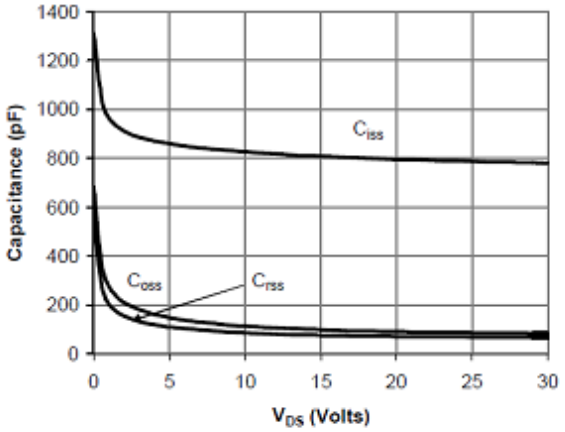


Figure 8: Capacitance Characteristics

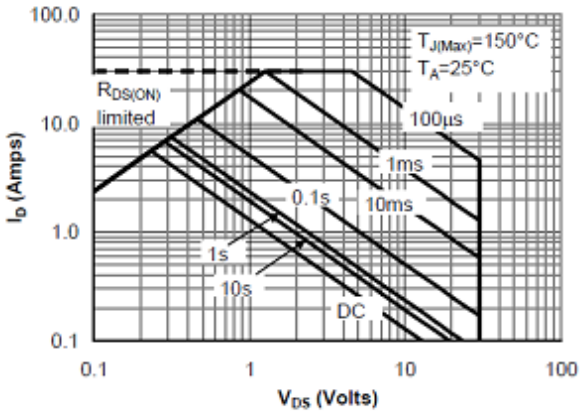


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

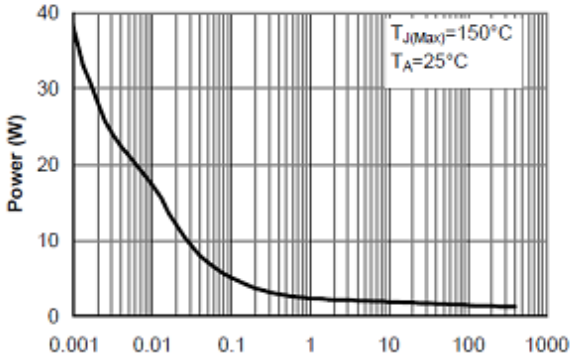


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

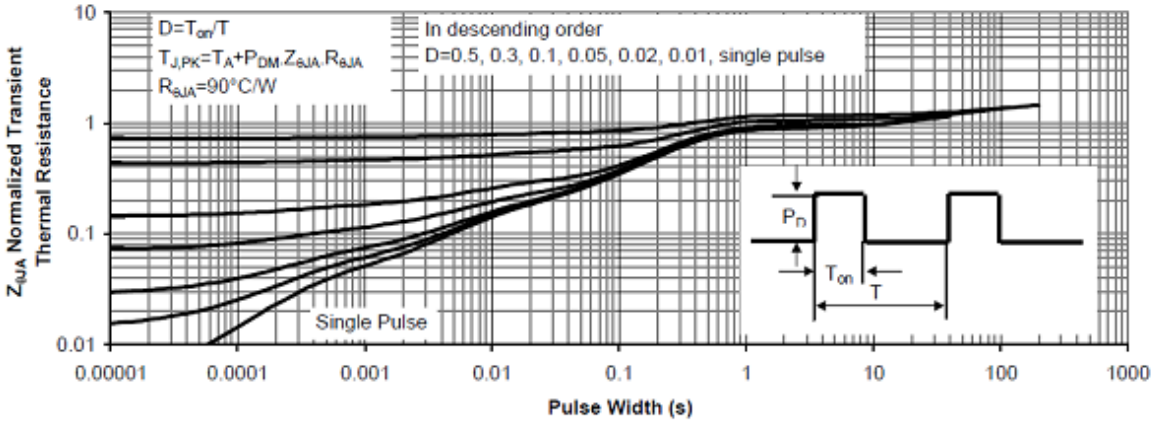
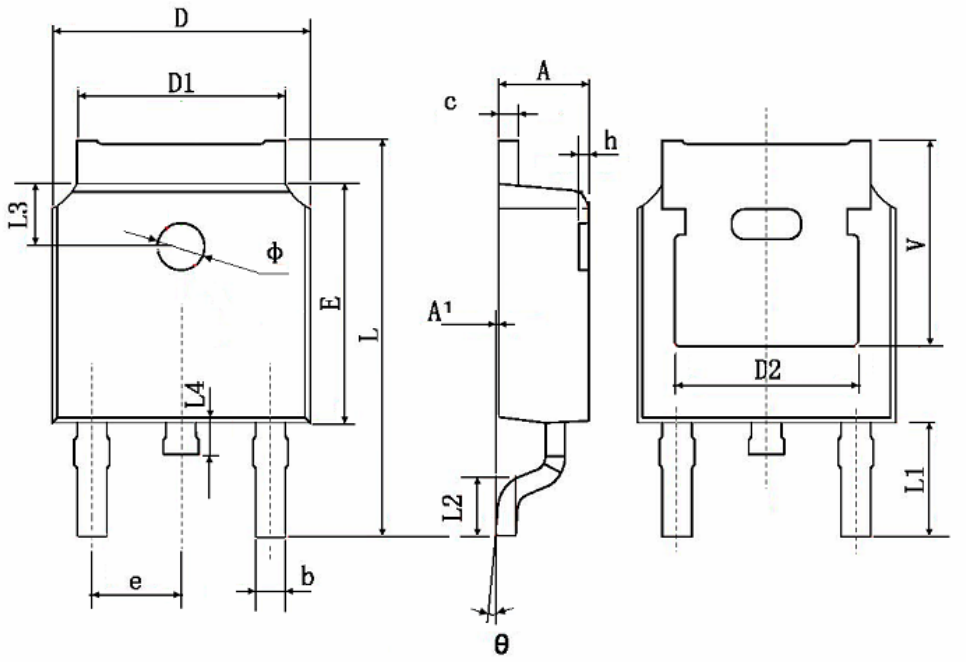


Figure 11: Normalized Maximum Transient Thermal Impedance

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.	

SHANGHAI SINO-IC MICROELECTRONICS CO., LTD

Add: Building 3, Room 3401-03, No.200 Zhangheng Road, ZhangJiang Hi-Tech Park, Pudong, Shanghai 201203, China
Phone: +86-21-33932402 33932403 33932405 33933508 33933608
Fax: +86-21-33932401
Email: webmaster@sino-ic.net
Website: http://www.sino-ic.net