

Main Product Characteristics

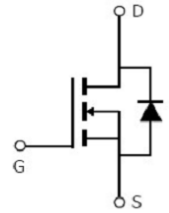
V_{DSS}	100V
$R_{DS(on)}$	3.7m Ω (Typ.)
I_D	145A ①



TO-220
SSS1004P



TO-263
SSS1004PA



Schematic Diagram

Features and Benefits

- Advanced Process Technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature



Description

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	145	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	105	
I_{DM}	Pulsed Drain Current ②	380	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation ③	215	W
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ $L=0.5\text{mH}$	196	mJ
I_{AS}	Avalanche Current @ $L=0.5\text{mH}$	28	A
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

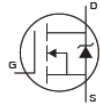
Thermal Resistance

Symbol	Characterizes	Value	Units
$R_{\theta JC}$	Junction-to-case ③	0.44	°C/W
$R_{\theta JA}$	Junction-to-ambient ④	50	°C/W

Electrical Characteristics @ $T_A=25^\circ\text{C}$ unless otherwise specified

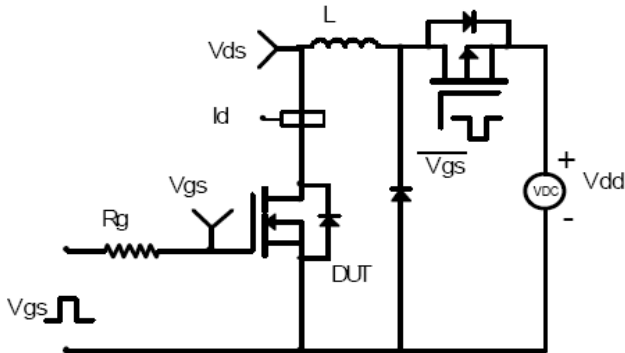
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.7	4.2	m Ω	$V_{GS}=10V, I_D=70A$
$V_{GS(th)}$	Gate threshold voltage	2	3	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 100V, V_{GS} = 0V$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
Q_g	Total gate charge	—	48	—	nC	$I_D = 70A,$ $V_{DS}=50V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	2	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	30	—		
$t_{d(on)}$	Turn-on delay time	—	23	—	ns	$V_{GS}=10V, V_{DD} = 50V,$ $R_{GEN}=4.7\Omega$ $I_D = 70A$
t_r	Rise time	—	30	—		
$t_{d(off)}$	Turn-Off delay time	—	35	—		
t_f	Fall time	—	15	—		
C_{iss}	Input capacitance	—	5675	—	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	670	—		$V_{DS} = 50V$
C_{rss}	Reverse transfer capacitance	—	25	—		$f = 1MHz$

Source-Drain Ratings and Characteristics

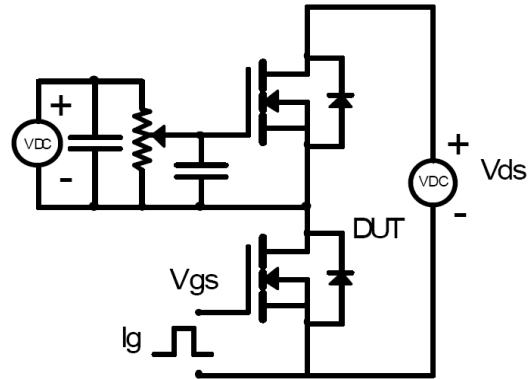
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode) ①	—	—	145	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	380	A	
V_{SD}	Diode Forward Voltage	—	—	1.2	V	$I_S=140A, V_{GS}=0V, T_J = 25^\circ\text{C}$
t_{rr}	Reverse Recovery Time	—	70	—	ns	$I_S=70A, di/dt=100A/us$
Q_{rr}	Reverse Recovery Charge	—	140	—	nC	

Test Circuits and Waveforms

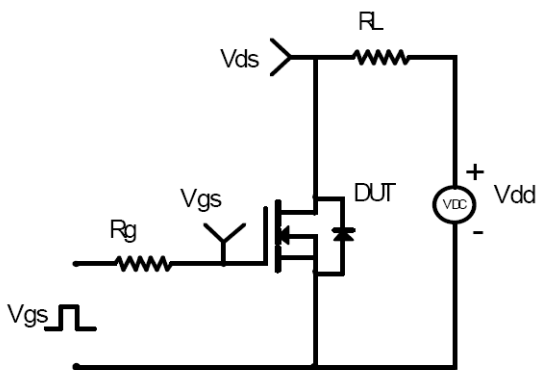
EAS Test Circuit:



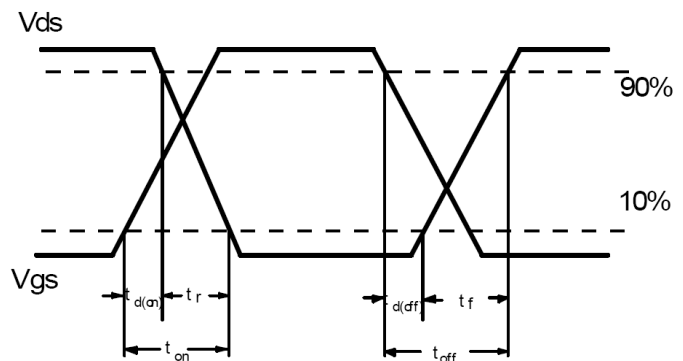
Gate charge test circuit:



Switching Time Test Circuit:



Switching Waveforms:



Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ C$

Typical Electrical and Thermal Characteristics

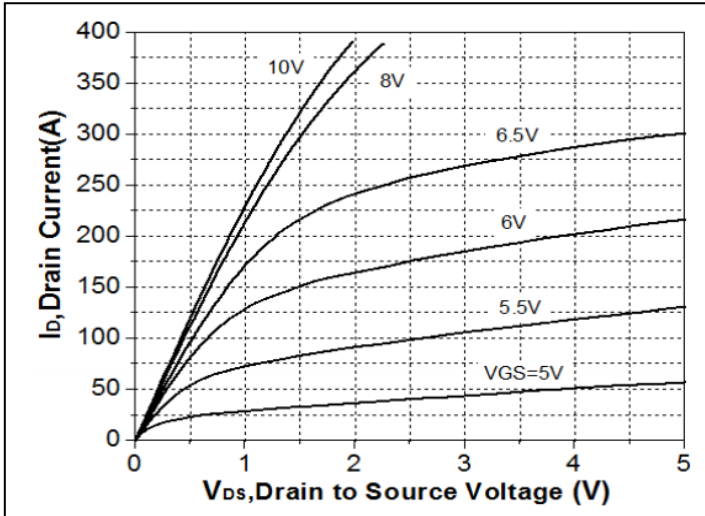


Figure1. Typical Output Characteristics

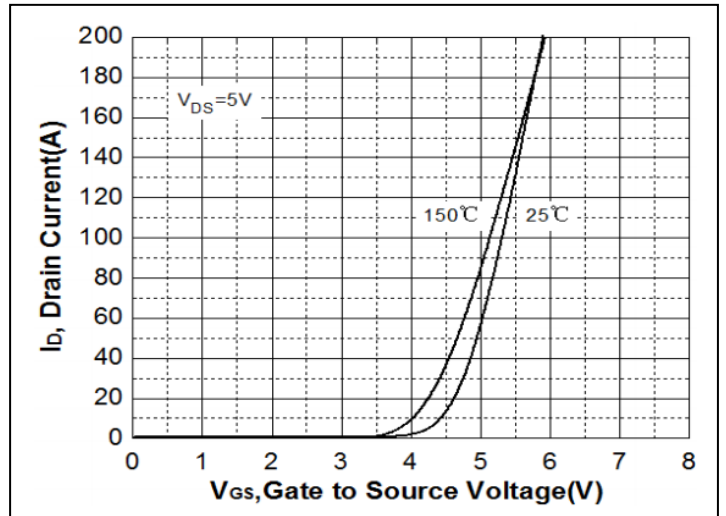


Figure2. Transfer Characteristics

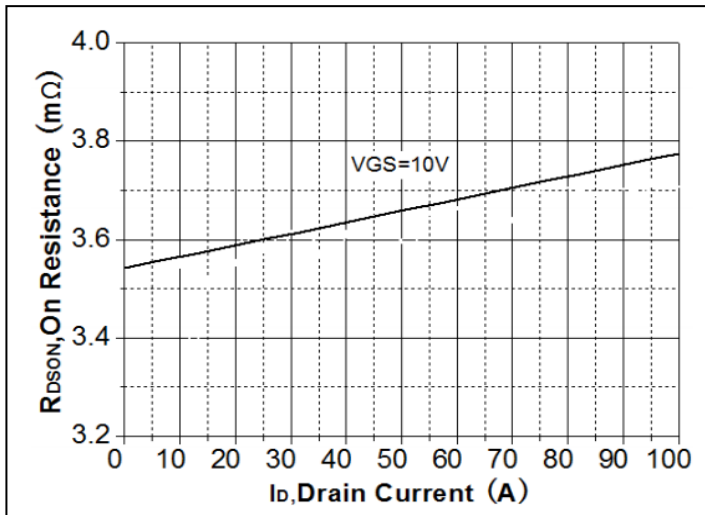


Figure3. On-Resistance vs. Drain Current

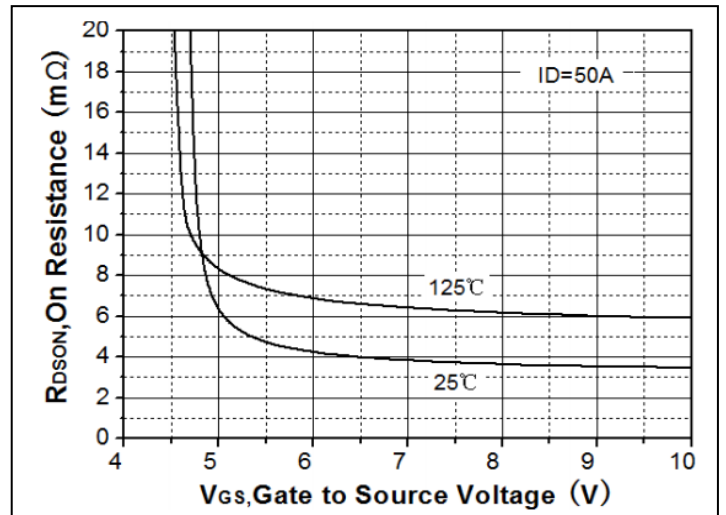


Figure4. On-Resistance vs. Gate to Source Voltage

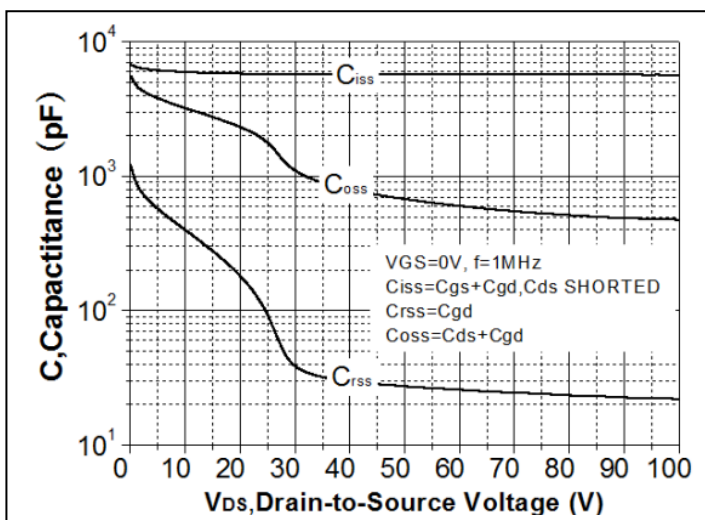


Figure5. Capacitance Characteristics

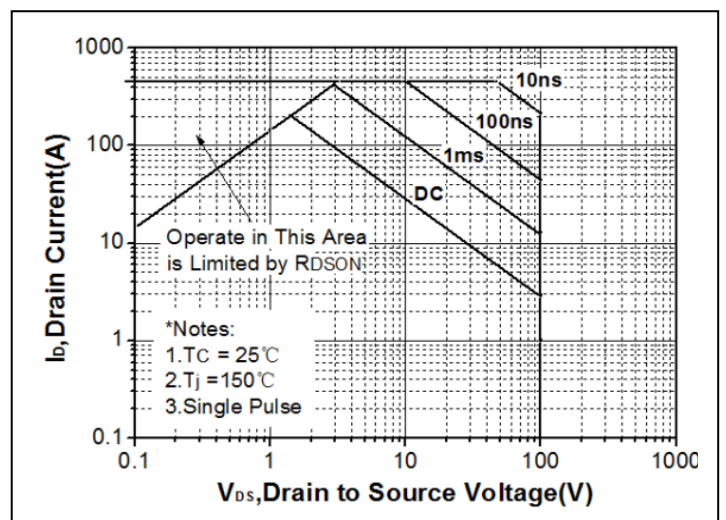


Figure6. Safe Operation Area

Typical Electrical and Thermal Characteristics

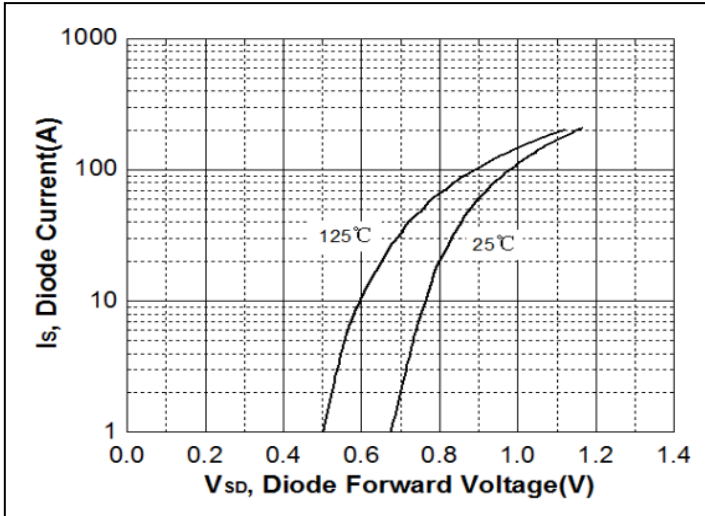


Figure7. Body-Diode Forward Characteristics

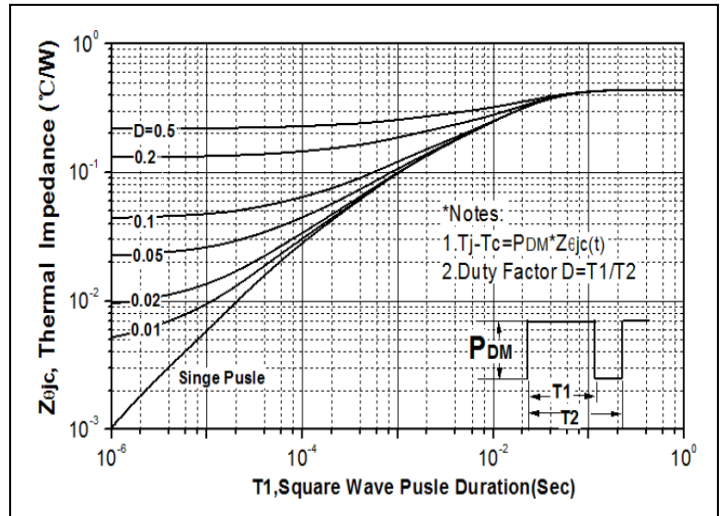
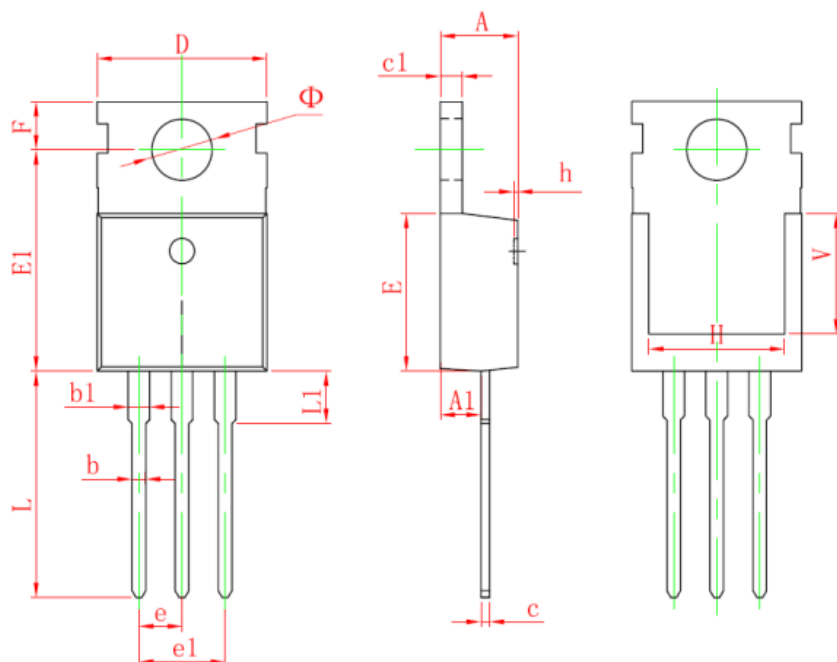
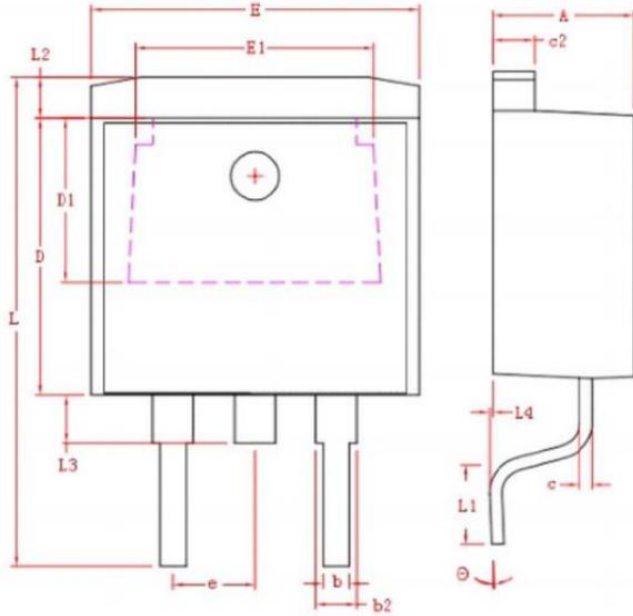


Figure8. Transient Thermal Response Curve

Mechanical Data:
TO-220 Package Outline Dimension


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

TO-263 Package Outline Dimension



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.40	4.60	4.80
b	0.76	0.88	1.00
L4	0.00	0.13	0.25
c	0.36	0.43	0.50
L3	1.50 REF.		
L1	2.29	2.64	2.79
E	9.80	10.10	10.40
E1	7.40 REF.		
c2	1.25	1.35	1.45
b2	1.17	1.32	1.47
D	8.60	8.80	9.00
D1	5.10 REF.		
e	2.54 REF.		
L	14.60	15.20	15.80
θ	0° ± 3°		
L2	1.27 REF.		

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Sales@silikron.com

Technical Support:

Technical@silikron.com

Suzhou Silikron Semiconductor Corp.

501 , NW-20,Nanopolis, 99th Jinjihu Avenue ,Industrial Park ,Suzhou ,P.R, CHINA

TEL: (86-512) 62560688

FAX: (86-512) 62560688-8092

E-mail: Sales@silikron.com