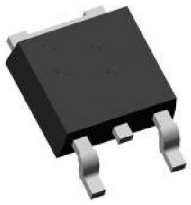
GOOD-ARK SEMICONDUCTOR

SSF4015

40V P-Channel MOSFET

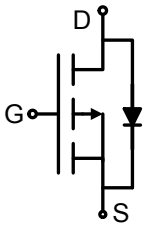
Main Product Characteristics

V_{DSS}	-40V
$R_{DS(on)}$	11mΩ (typ.)
I_D	-40A



TO-252 (DPAK)

Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced trench MOSFET process technology
- Ideal for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- High power and current handling capability
- 175°C operating temperature

Description

The SSF4015 utilizes the latest processing techniques to achieve high cell density, low on-resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable for use in power switching applications and a wide variety of other applications.

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V①	-40	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V①	-28	
I_{DM}	Pulsed Drain Current②	-120	
I_{SM}	Pulsed Source Current (Body Diode)②	-120	
P_D @T_C = 25°C	Power Dissipation③	75	W
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH	40	mJ
I_{AS}	Single Pulse Avalanche Current @ L=0.1mH	28	A
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

Symbol	Characteristics	Value	Unit
$R_{\theta JA}$	Junction-to-Ambient (t ≤ 10s) ④	14	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	40	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case⑤	2	°C/W

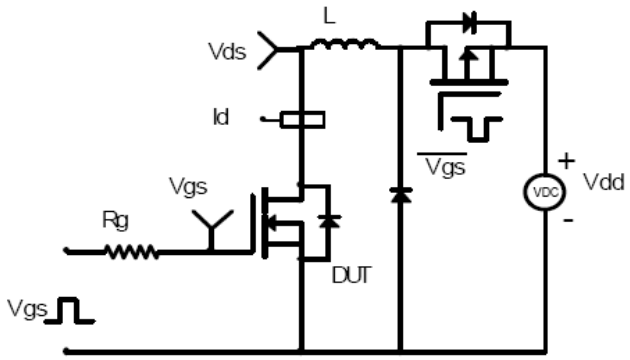
Electrical Characteristics (T_A=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source breakdown voltage	-40	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	11	15	mΩ	V_{GS}=10V, I_D = 12A
		—	14.3	—		T_J = 125℃
		—	18.5	25		V_{GS}=4.5V, I_D = 8A
		—	23.6	—		T_J = 125°C
$V_{GS(th)}$	Gate threshold voltage	-1		-3	V	V_{DS} = V_{GS}, I_D =250uA
I_{DSS}	Drain-to-Source leakage current	—	—	-1	μA	V_{DS} =-40V, V_{GS} = 0V
		—	—	-5		T_J = 55°C
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =20V
	Gate-to-Source reverse leakage	—	—	-100		V_{GS} = -20V
$G_{(fs)}$	Forward transconductance	5	27	—	S	V_{DS}=-5V, I_D=-12.0A
Q_g	Total gate charge	—	57.4	40	nC	I_D=-20A, V_{DD}=-12V, V_{GS}=-10V
Q_{gs}	Gate-to-Source charge	—	10.8	6		
Q_{gd}	Gate-to-Drain("Miller") charge	—	11.9	15		
$t_{d(on)}$	Turn-on delay time	—	15.2	—	ns	V_{DD}=-18.8V, I_D=-12.5A, R_L=1.50Ω, R_G=3.00Ω, V_{GS}=-10V
t_r	Rise time	—	23.7	—		
$t_{d(off)}$	Turn-Off delay time	—	53.3	—		
t_f	Fall time	—	12.7	—		
C_{iss}	Input capacitance	—	5188	—	pF	Vds=-20V, Vgs=0V, f=1MHZ
C_{oss}	Output capacitance	—	376	—		
C_{rss}	Reverse transfer capacitance	—	293	—		

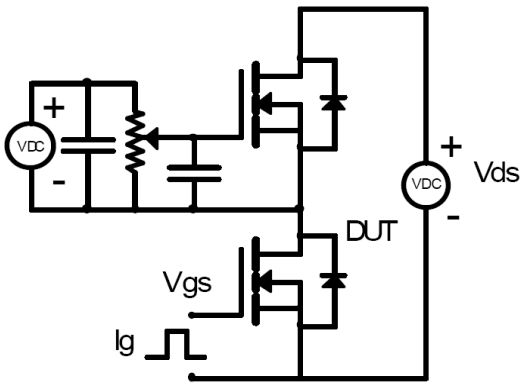
Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Maximum Body-Diode Continuous Curren.	—	-40	—	A	
V_{SD}	Diode Forward Voltage	—	-0.74	1.2	V	T_J=25°C, I_S=-1A, V_{GS}=0V

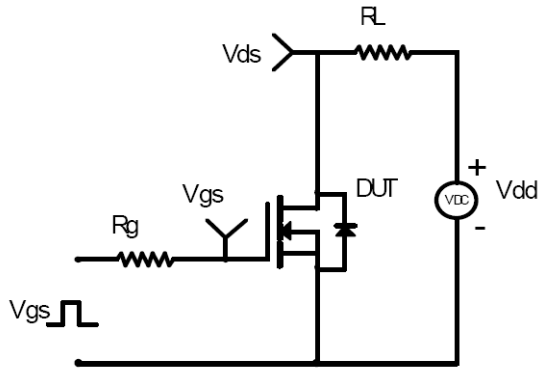
Test Circuits and Waveforms



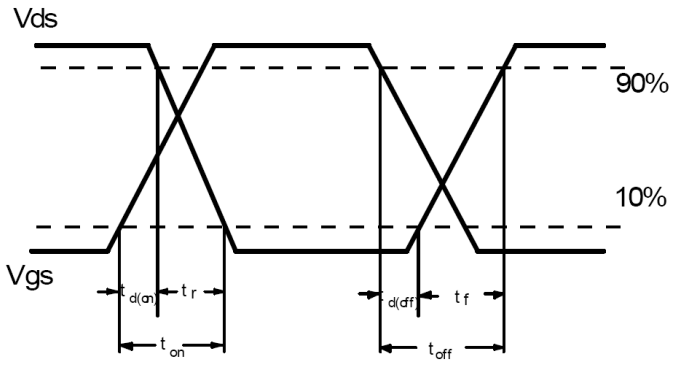
E_{AS} Test Circuit



Gate Charge Test Circuit



Switching Time Test Circuit



Switching Waveforms

Notes

①Calculated continuous current based on maximum allowable junction temperature.

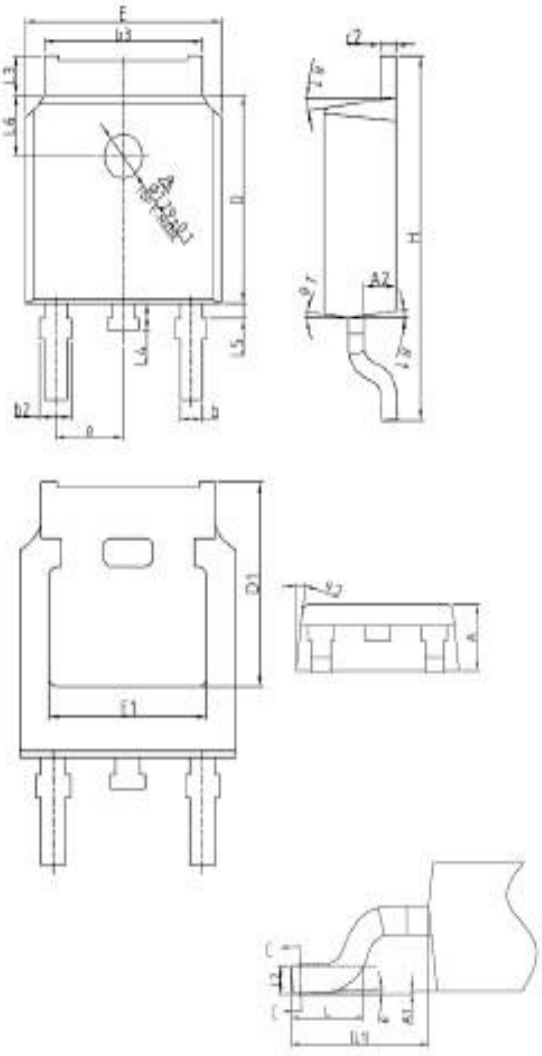
②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.

④The 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°C

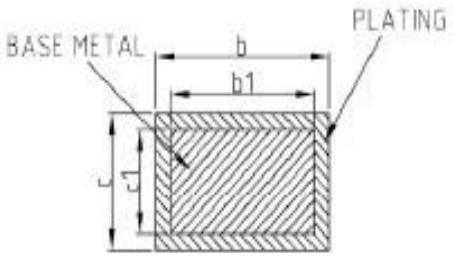
Mechanical Data

TO-252E-2-M PACKAGE INFORMATION



Dimensions in Millimeters

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	–	0.10
A2	0.90	1.01	1.10
b	0.72	–	0.85
b1	0.71	0.76	0.81
b2	0.72	–	0.90
b3	5.13	5.33	5.46
c	0.47	–	0.60
c1	0.46	0.51	0.56
c2	0.47	–	0.60
D	6.00	6.10	6.20
D1	5.25	–	–
E	6.50	6.60	6.70
E1	4.70	–	–
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.51BSC	
L3	0.90	–	1.25
L4	0.60	0.80	1.00
L5	0.15	–	0.75
L6		1.80REF	
θ	0°	–	8°
θ1	5°	7°	9°
θ2	5°	7°	9°



Ordering and Marking Information

Device Marking: SSF4015

Package (Available)
TO-252/DPAK
Operating Temperature
Range C : -55 to 175°C

Devices per Unit

Option 1

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO-252	80	50	4000	10	40000

Option 2

Package Type	Units/ Tape	Tapes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO-252	2500	2	5000	7	35000

Option 3

Package Type	Units/ Tape	Tapes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO-252	2500	1	2500	10	25000