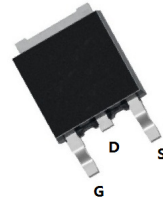
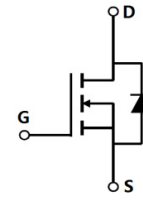


Main Product Characteristics

$V_{DSS@T_J \text{ max}}$	650V
$R_{DS(on)}$	2.5Ω (typ.)
I_D	1.5A



TO-252



Schematic Diagram

Features and Benefits

- Low $R_{DS(on)}$ and FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Easy to drive



Description

SSF60R2K8D utilize the latest 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.

Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain Source Voltage	V_{DS}	600	V
Gate Source Voltage	V_{GS}	±30	V
Continuous Drain Current ¹⁾	I_D	1.5	A
Continuous Drain Current ¹⁾ $T_J=100^\circ\text{C}$		0.95	
Pulsed Drain Current ²⁾	$I_{D, \text{ pulse}}$	4.5	A
Power Dissipation ³⁾	P_D	18.1	W
Single Pulsed Avalanche Energy ⁵⁾	E_{AS}	10	mJ
MOSFET dv/dt Ruggedness, $V_{DS}=0\dots480\text{ V}$	dv/dt	50	V/ns
Reverse Diode dv/dt, $V_{DS}=0\dots480\text{ V}$, $I_{SD}\leq I_D$	dv/dt	15	V/ns
Operation and Storage Temperature	T_{stg} T_J	-55 to 150	°C

Thermal Resistance

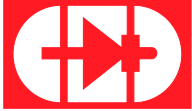
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6.9	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient ⁴⁾	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-Source Breakdown Voltage	BV_{DSS}	600			V	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$
		650	750			$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$ $T_j=150\ ^{\circ}\text{C}$
Gate Threshold Voltage	$V_{GS(th)}$	2.0		4.0	V	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$
Drain-Source On-state Resistance	$R_{DS(on)}$		2.5	2.8	Ω	$V_{GS}=10\text{ V}, I_D=0.75\text{ A}$
			5.6			$V_{GS}=10\text{ V}, I_D=0.75\text{ A},$ $T_j=150\ ^{\circ}\text{C}$
Gate-Source Leakage Current	I_{GSS}			100	nA	$V_{GS}=30\text{ V}$
				-100		$V_{GS}=-30\text{ V}$
Drain-Source Leakage Current	I_{DSS}			1	μA	$V_{DS}=600\text{ V}, V_{GS}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input Capacitance	C_{iss}		111.9		pF	$V_{GS}=0\text{ V},$ $V_{DS}=50\text{ V},$ $f=1\text{ MHz}$
Output Capacitance	C_{oss}		10.28		pF	
Reverse Transfer Capacitance	C_{riss}		0.86		pF	
Turn-on Delay Time	$t_{d(on)}$		23.9		ns	$V_{GS}=10\text{ V},$ $V_{DS}=400\text{ V},$ $R_G=25\ \Omega,$ $I_D=0.8\text{ A}$
Rise Time	t_r		8.1		ns	
Turn-off Delay Time	$t_{d(off)}$		52.7		ns	
Fall Time	t_f		14.1		ns	



Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total Gate Charge	Q_g		4.2		nC	$I_D=1\text{ A}$, $V_{DS}=400\text{ V}$, $V_{GS}=10\text{ V}$
Gate-Source Charge	Q_{gs}		1		nC	
Gate-Drain Charge	Q_{gd}		2.3		nC	
Gate Plateau Voltage	$V_{plateau}$		5.6		V	

Body Diode Characteristics

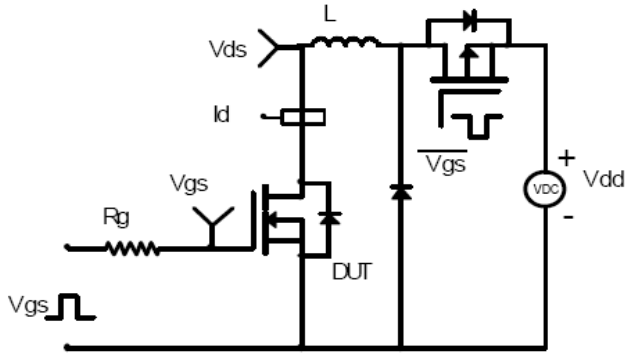
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode Forward Current	I_S			1.5	A	$V_{GS}<V_{th}$
Pulsed Source Current	I_{SP}			4.5		
Diode Forward Voltage	V_{SD}			1.3	V	$I_S=1.5\text{ A}$, $V_{GS}=0\text{ V}$
Reverse Recovery Time	t_{rr}		81.9		ns	$I_S=0.8\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}		0.26		μC	
Peak Reverse Recovery Current	I_{rrm}		6.5		A	

Notes

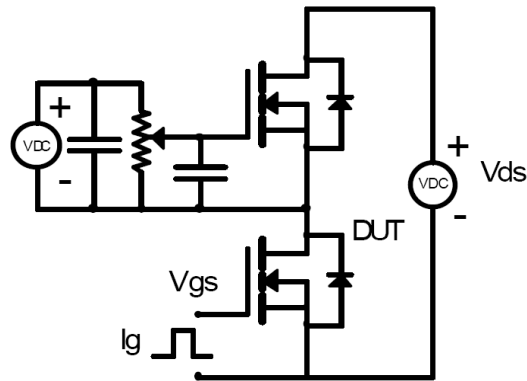
- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating, pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=50\text{ V}$, $R_G=25\text{ }\Omega$, $L=22.5\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Test Circuits and Waveforms

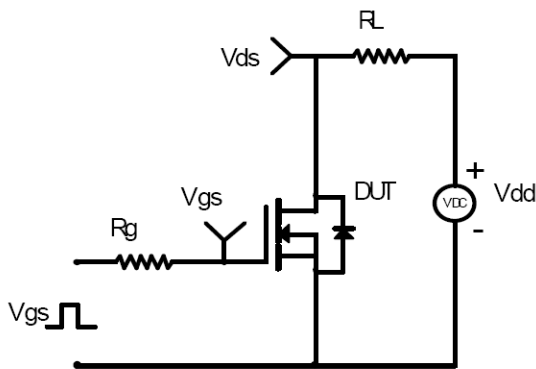
EAS Test Circuit



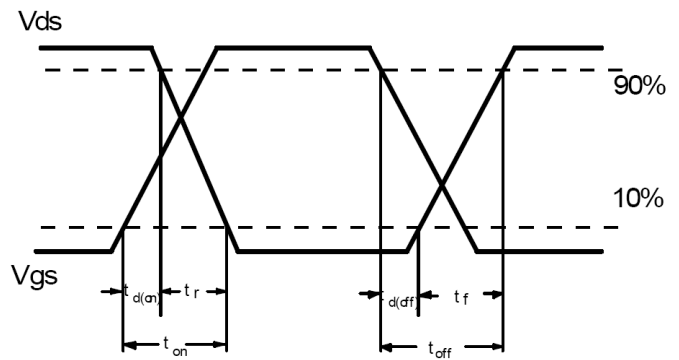
Gate charge test circuit



Switching Time Test Circuit



Switching Waveforms



Typical Electrical and Thermal Characteristics

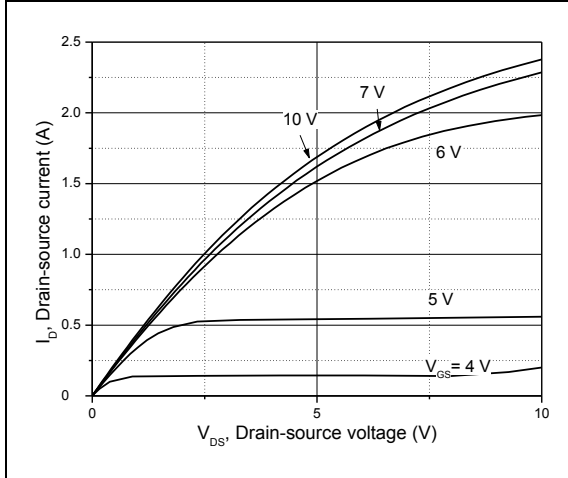


Figure 1, Typ. output characteristics

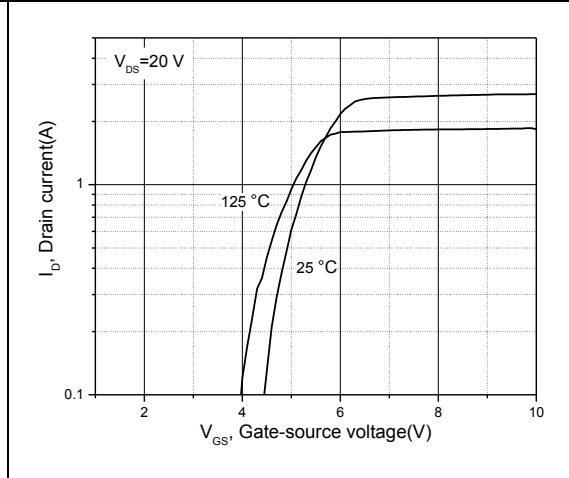


Figure 2, Typ. transfer characteristics

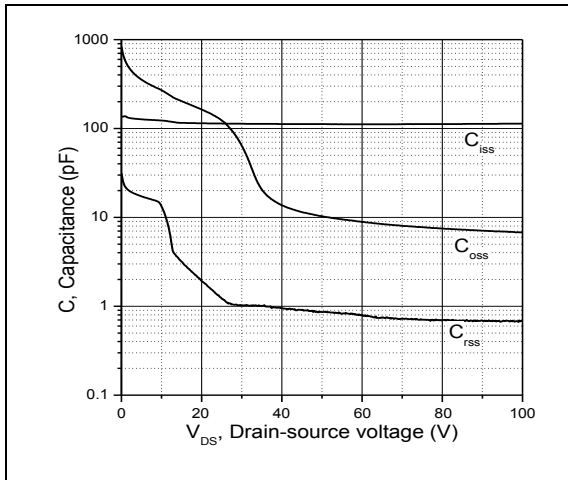


Figure 3, Typ. capacitances

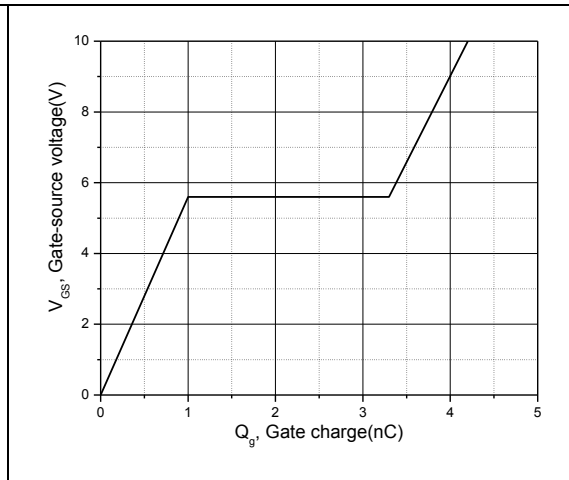


Figure 4, Typ. gate charge

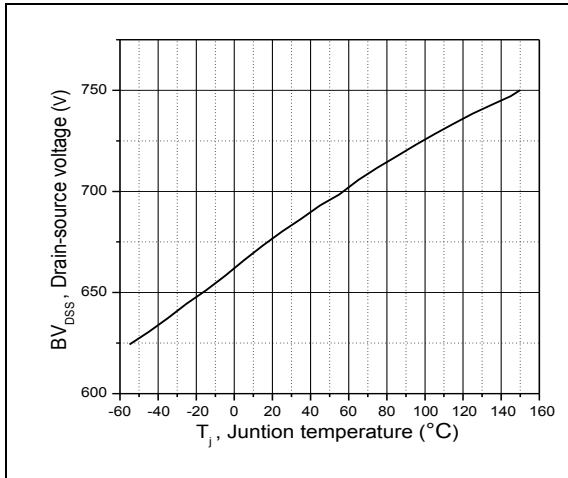


Figure 5, Drain-source breakdown voltage

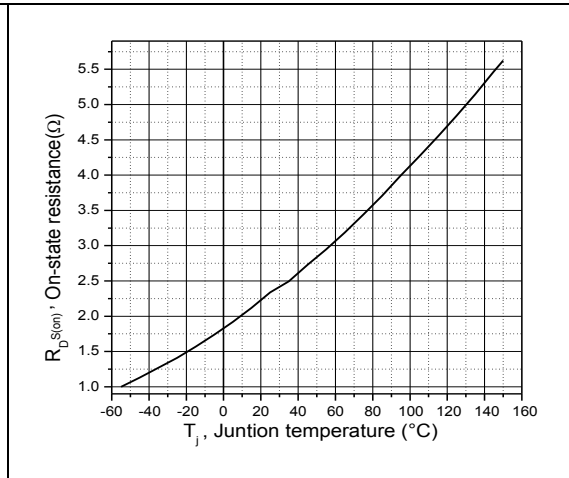


Figure 6, Drain-source on-state resistance

Typical Electrical and Thermal Characteristics

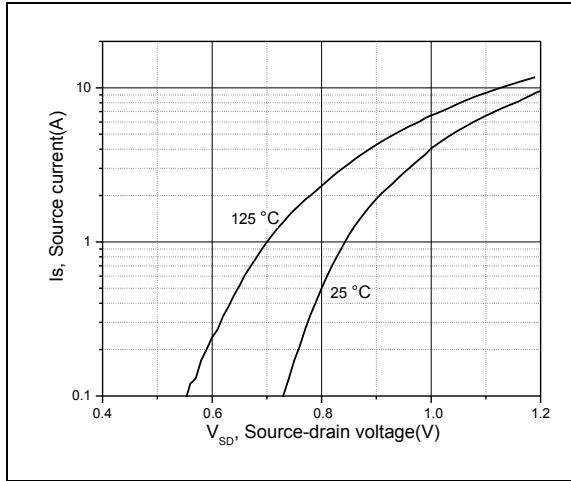


Figure 7, Forward characteristic of body diode

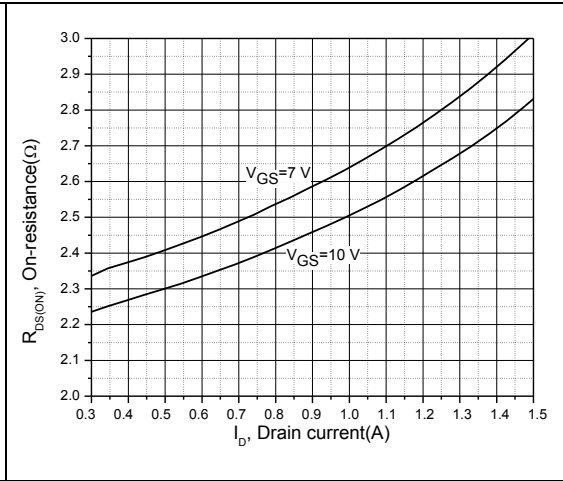


Figure 8, Drain-source on-state resistance

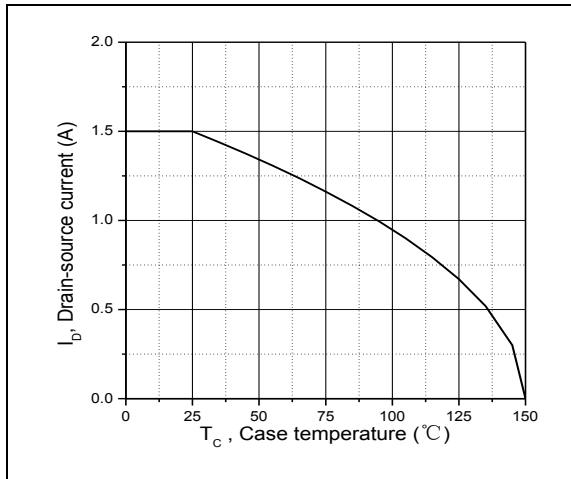


Figure 9, Drain current

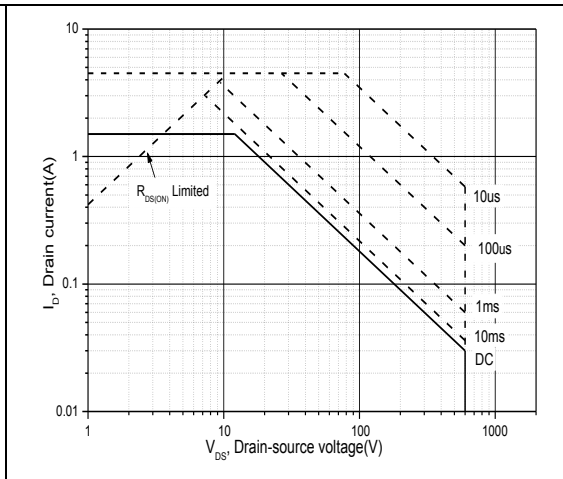
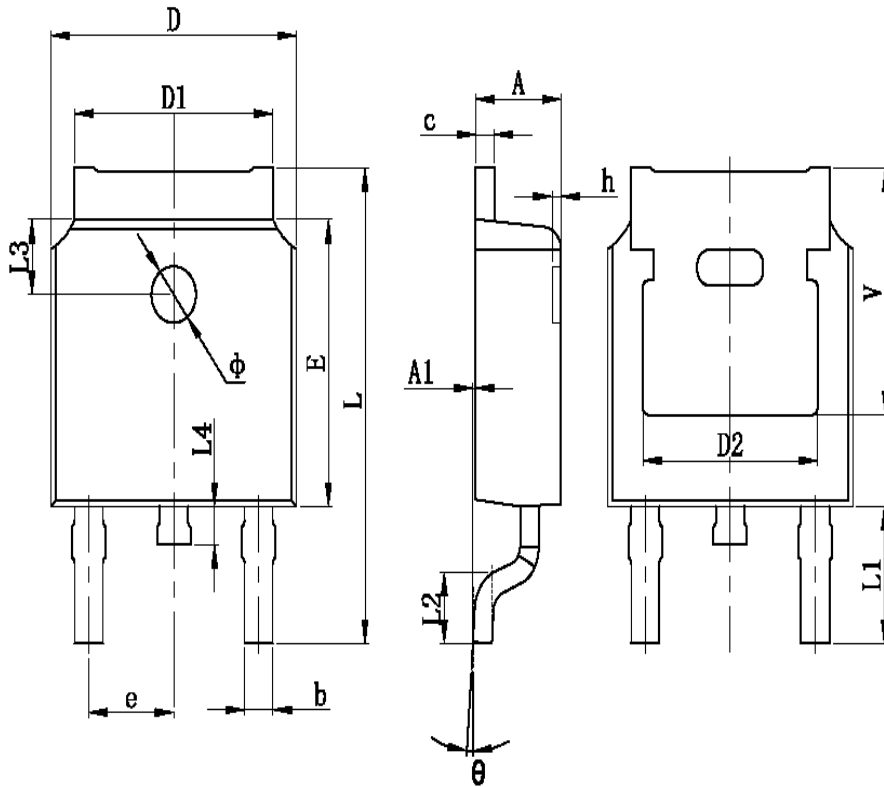


Figure 10, Safe operation area

Package Outline Dimensions

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	4.830 REF.		0.190 REF.	
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 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
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 REF.		0.211 REF.	

Ordering and Marking Information

Device Marking: SSF60R2K8D

**Package (Available)
TO-252**

**Operating Temperature Range
C : -55 to 150°C**

Devices per Unit

Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO252 Option1	75	66	4950	6	29700

Package	Units/Tape	Tapes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO252 Option2	2500	2	5000	5	25000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_J = 150^\circ\text{C}$ @80% of Max V_{DSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_J = 150^\circ\text{C}$ @100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices