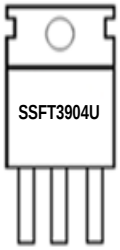
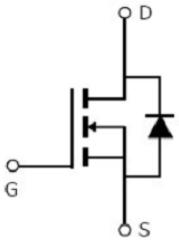
Main Product Characteristics:

V_{DSS}	35V
R_{DS}(on)	3.0mohm(typ.)
I_D	110A

TO220



Marking and pin Assignment



Schematic diagram

Features and Benefits:

- Advanced trench MOSFET 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
- 175℃ operating temperature

Description:

It utilizes the latest trench 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 @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V①	110	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	80	
I_{DM}	Pulsed Drain Current②	440	
P_D @TC = 25°C	Power Dissipation③	100	W
	Linear Derating Factor	0.55	W/°C
V_{DS}	Drain-Source Voltage	35	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH	320	mJ
I_{AS}	Avalanche Current @ L=0.1mH	80	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

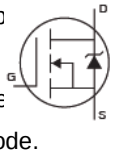
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	1.5	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	62	℃/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	40	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

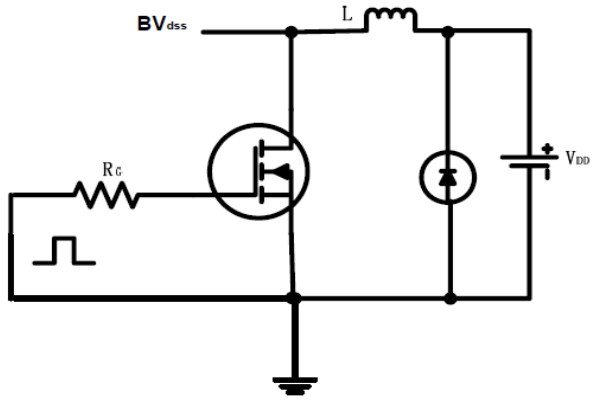
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	35	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3	4	mΩ	V_{GS}=10V,I_D =30A
		—	3.9	—		T_J = 125℃
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	5	6	mΩ	V_{GS}=4.5V,I_D =16A
		—	5.8	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	1	—	3	V	V_{DS} = V_{GS}, I_D = 250μA
		—	1.1	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 35V,V_{GS} = 0V
		—	—	50		T_J = 125°C
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =20V
		-100	—	—		V_{GS} = -20V
Q_g	Total gate charge	—	57	—	nC	V_{DS}=15V,
Q_{gs}	Gate-to-Source charge	—	17	—		I_D=30A,
Q_{gd}	Gate-to-Drain("Miller") charge	—	26	—		V_{GS}=10V
$t_{d(on)}$	Turn-on delay time	—	14.5	—	ns	V_{GS}=4.5V, VDS=15V, R_{GEN}=4.7Ω, I_D=30A
t_r	Rise time	—	73.9	—		
$t_{d(off)}$	Turn-Off delay time	—	99.7	—		
t_f	Fall time	—	107.1	—		
C_{iss}	Input capacitance	—	5520	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	623	—		V_{DS} = 15V
C_{rss}	Reverse transfer capacitance	—	594	—		f = 600KHz

Source-Drain Ratings and Characteristics

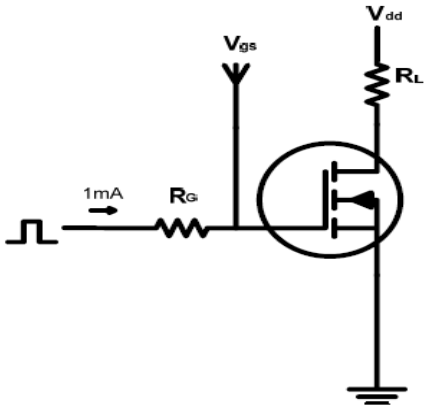
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	440	A	
V_{sd}	Diode Forward Voltage	—	0.67	1.3	V	I_S=2.1A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	22.1	—	ns	T_J = 25°C, I_F =30A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	8.7	—	nC	

Test circuits and Waveforms

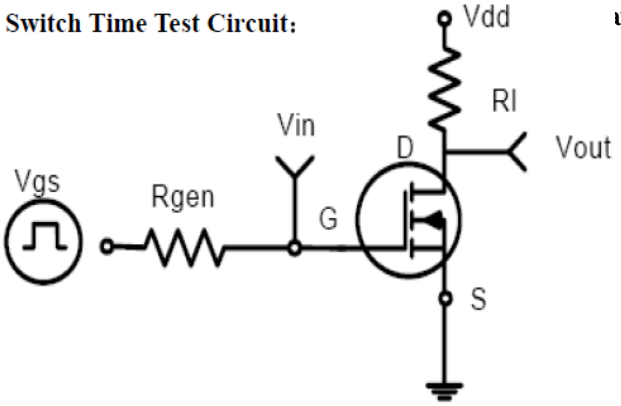
EAS test circuits:



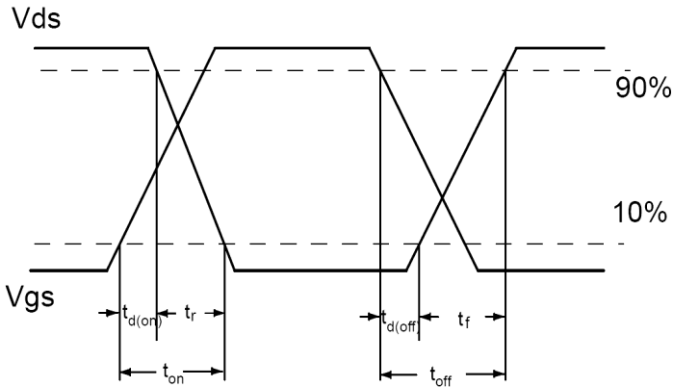
Gate charge test circuit:



Switch Time Test Circuit:



ıveforms:



Notes:

①The maximum current rating is limited by bond-wires.

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

③The power dissipation PD 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 1in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

Typical electrical characteristics

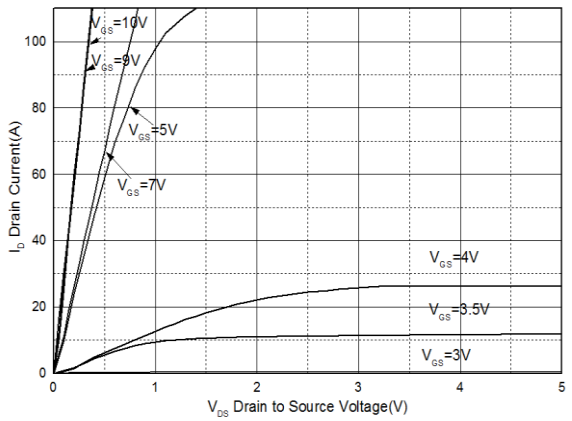


Figure 1: Typical Output Characteristics

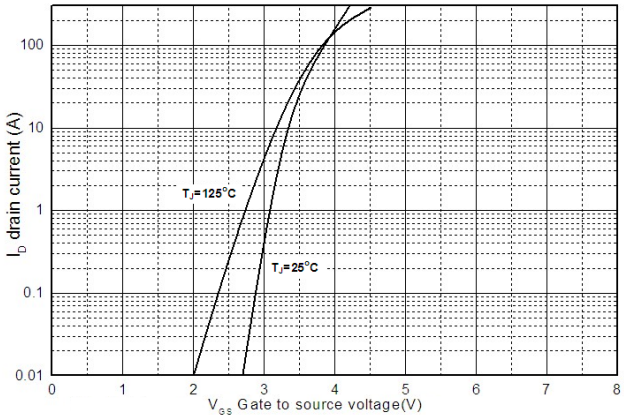


Figure 2: Typical Transfer Characteristics

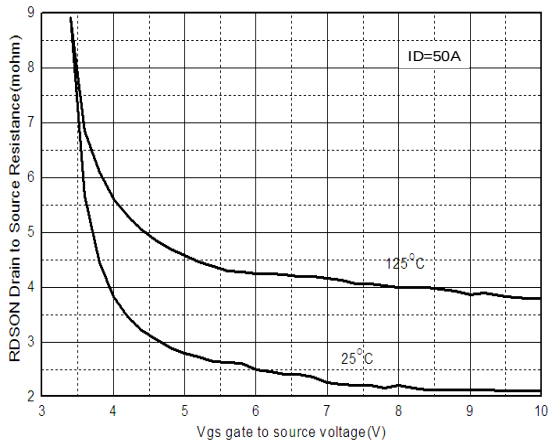


Figure 3: On-Resistance vs. Gate-Source Voltage

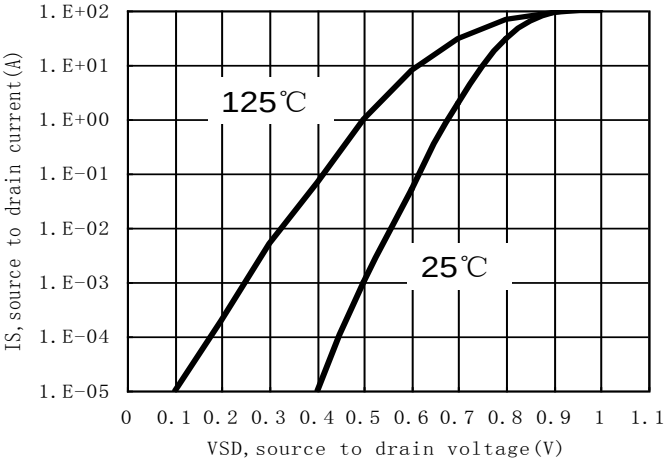


Figure 4: Body-Diode Characteristics

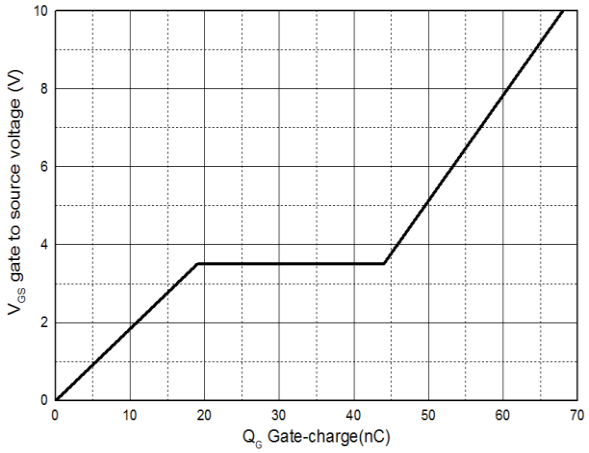


Figure 5: Gate-Charge Characteristics

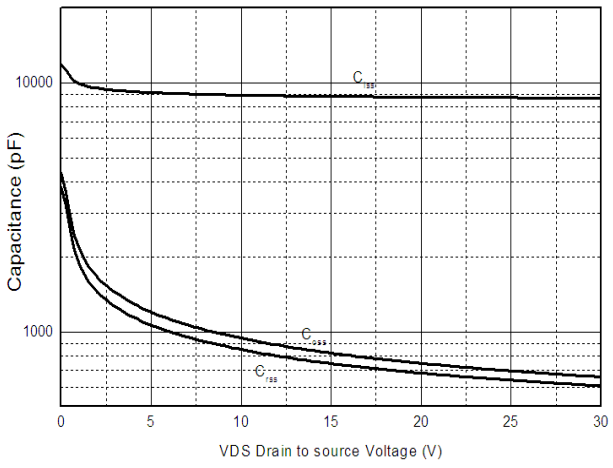


Figure 6: Capacitance Characteristics

Typical thermal characteristics

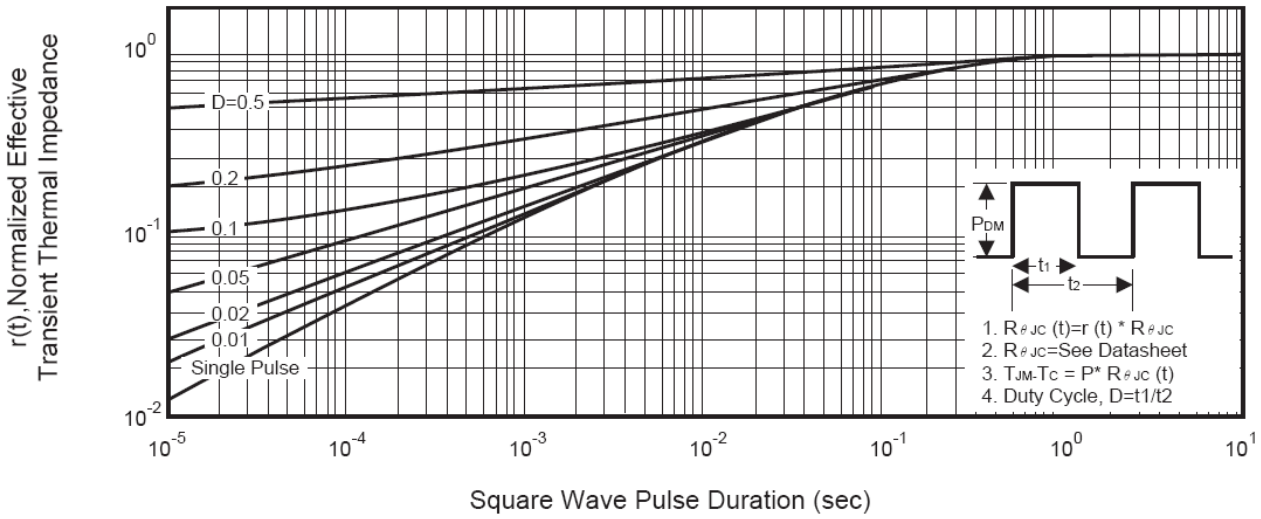
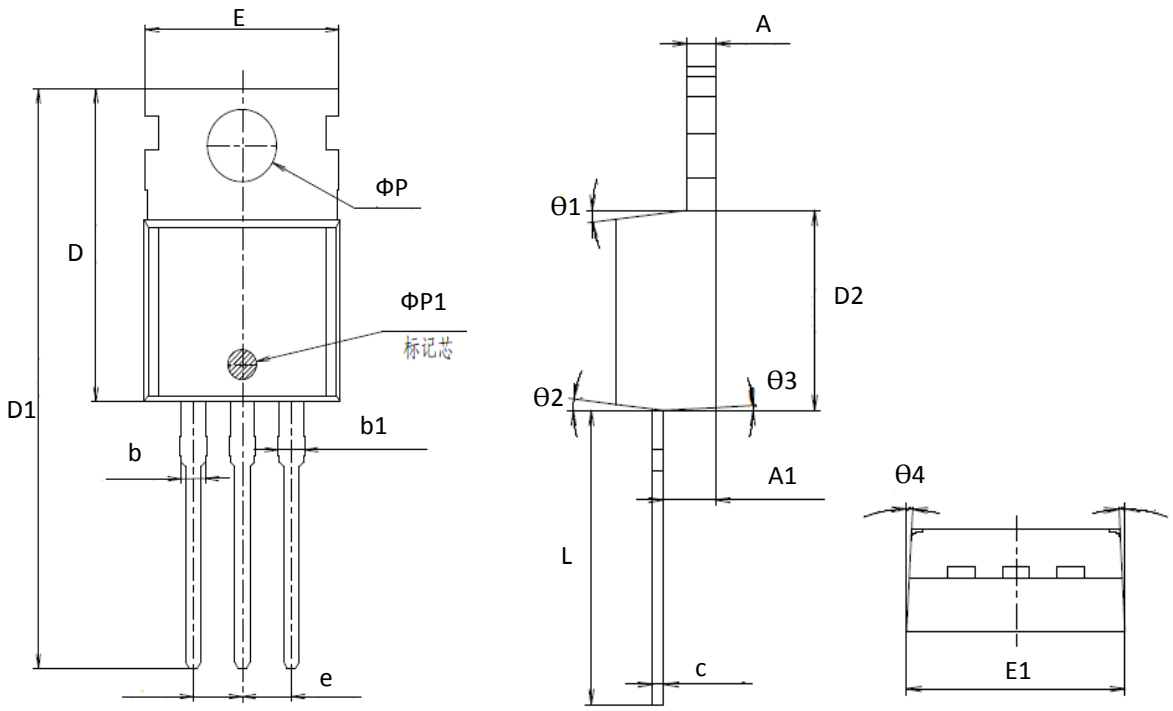


Figure 7: Normalized Thermal transient Impedance Curve

Mechanical Data：

TO220 PACKAGE OUTLINE DIMENSION_GN



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	1.300	-	-	0.051	-
A1	2.200	2.400	2.600	0.087	0.094	0.102
b	-	1.270	-	-	0.050	-
b1	1.270	1.370	1.470	0.050	0.054	0.058
c	-	0.500	-	-	0.020	-
D	-	15.600	-	-	0.614	-
D1	-	28.700	-	-	1.130	-
D2	-	9.150	-	-	0.360	-
E	9.900	10.000	10.100	0.390	0.394	0.398
E1	-	10.160	-	-	0.400	-
ΦP	-	3.600	-	-	0.142	-
ΦP1		1.500		0.059		
e	2.54BSC			0.1BSC		
L	12.900	13.100	13.300	0.508	0.516	0.524
θ1	-	7^0	-	-	7^0	-
θ2	-	7^0	-	-	7^0	-
θ3	-	3^0	-	5^0	7^0	9^0
θ4	-	3^0	-	1^0	3^0	5^0

Ordering and Marking Information

Device Marking: SSFT3904U

Package (Available)

TO220

Operating Temperature Range

C : -55 to 175 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO220	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T_j=125℃ to 175℃ @ 80% of Max V_{DSS}/V_{CES}/VR	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	T_J=125℃ to 175℃ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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