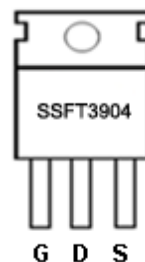
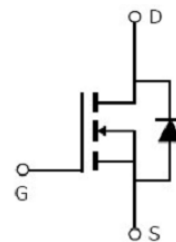


Main Product Characteristics:

V_{DSS}	30V
$R_{DS(on)}$	2.6m Ω (typ.)
I_D	110A


TO220

Marking and pin Assignment

Schematic diagram
Features and Benefits:

- Advanced 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°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 @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V ^①	110	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V ^①	80	
I_{DM}	Pulsed Drain Current ^②	440	
P_D @TC = 25°C	Power Dissipation ^③	100	W
	Linear Derating Factor	0.55	W/°C
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH ^②	320	mJ
I_{AR}	Avalanche Current @ L=0.1mH ^②	80	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

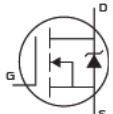
Thermal Resistance

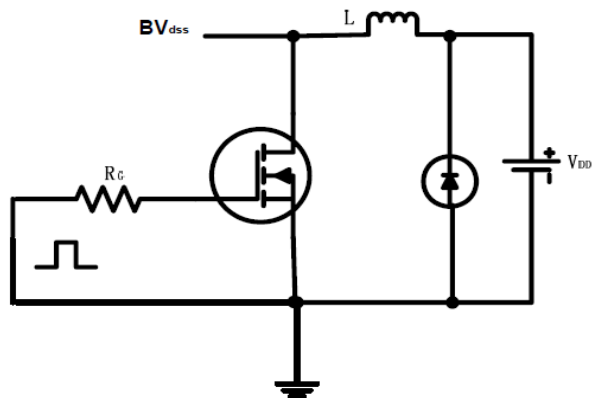
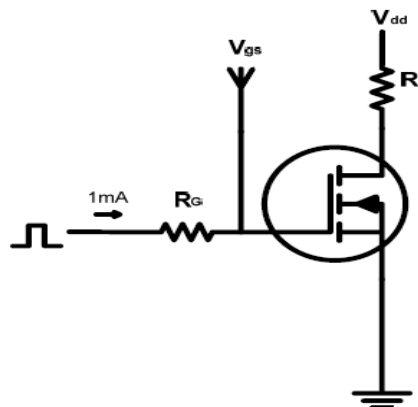
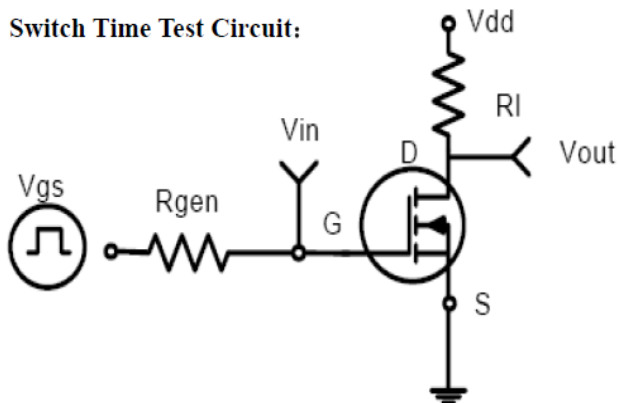
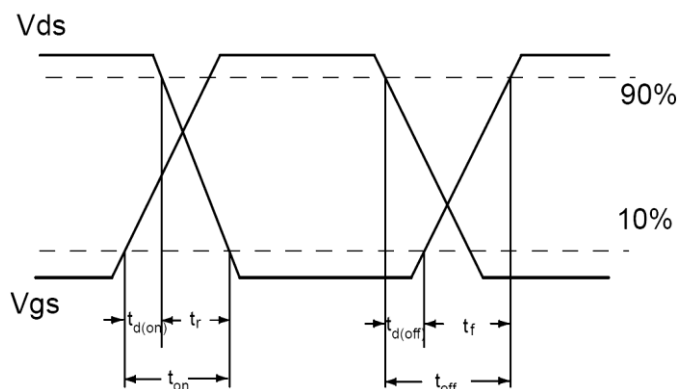
Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	1.5	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	2.6	3.6	mΩ	$V_{GS}=10V, I_D = 30A$ $T_J = 125^\circ\text{C}$
		—	3.8	—		
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.2	5	mΩ	$V_{GS}=4.5V, I_D = 16A$ $T_J = 125^\circ\text{C}$
		—	4.8	—		
$V_{GS(th)}$	Gate threshold voltage	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$ $T_J = 125^\circ\text{C}$
		—	1.3	—		
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 30V, V_{GS} = 0V$ $T_J = 125^\circ\text{C}$
		—	—	50		
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$ $V_{GS} = -20V$
		—	—	-100		
Q_g	Total gate charge	—	68	—	nC	$V_{DS}=15V,$ $I_D=16A,$ $V_{GS}=5V$
Q_{gs}	Gate-to-Source charge	—	19	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	25	—		
$t_{d(on)}$	Turn-on delay time	—	19	—	ns	$V_{GS}=10V, V_{DS}=15V,$ $R_{GEN}=6\Omega, I_D=1A$
t_r	Rise time	—	18	—		
$t_{d(off)}$	Turn-Off delay time	—	145	—		
t_f	Fall time	—	63	—		
C_{iss}	Input capacitance	—	9291	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1MHz$
C_{oss}	Output capacitance	—	748	—		
C_{rss}	Reverse transfer capacitance	—	702	—		

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	440	A	
V_{SD}	Diode Forward Voltage	—	0.85	1.3	V	$I_S=50A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	20	—	ns	$T_J = 25^\circ\text{C}, I_F = 32A,$
Q_{rr}	Reverse Recovery Charge	—	7.8	—	nC	$di/dt = 100A/\mu s$

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Waveforms:

Notes:

- ① The maximum current rating is limited by bond-wires.
- 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 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 175^\circ\text{C}$.

Typical electrical characteristics

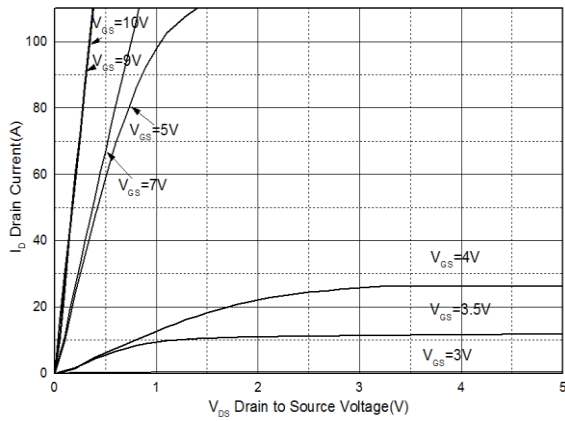


Figure 1: Typical Output Characteristics

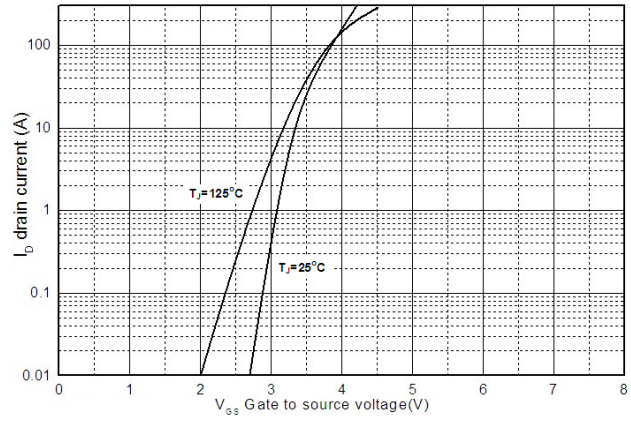


Figure 2: Typical Transfer Characteristics

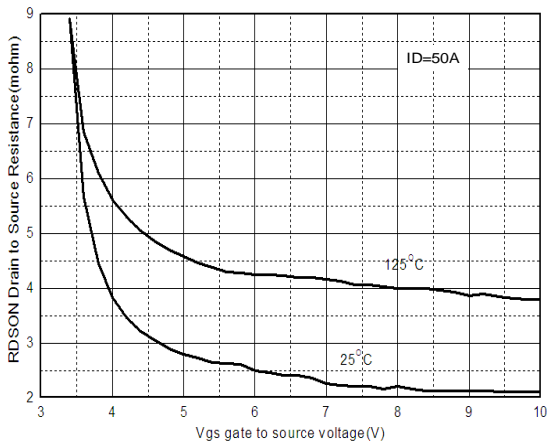


Figure 3: On-Resistance vs. Gate-Source Voltage

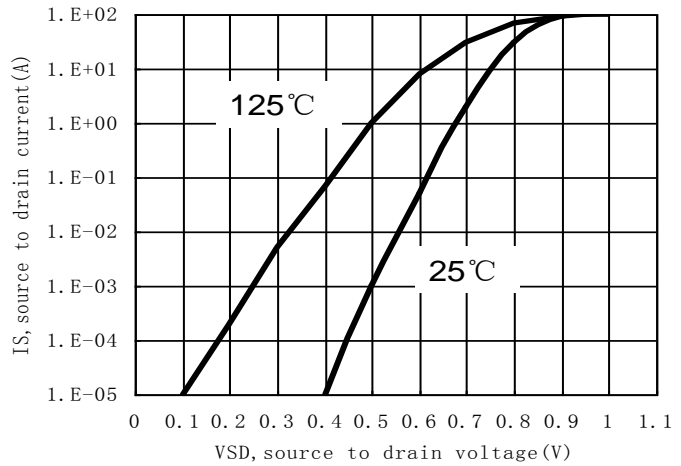


Figure 4: Body-Diode Characteristics

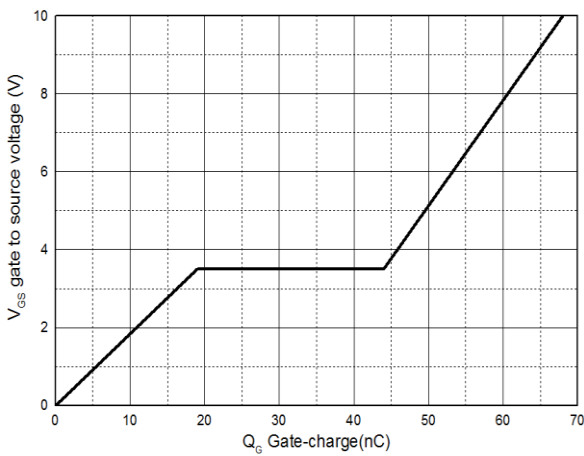


Figure 5: Gate-Charge Characteristics

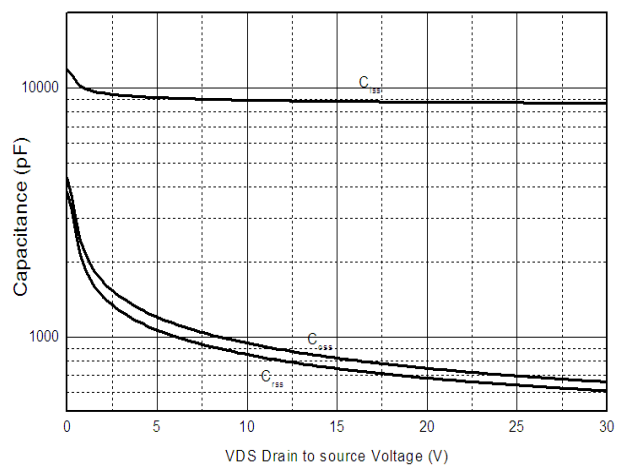


Figure 6: Capacitance Characteristics

Typical thermal characteristics

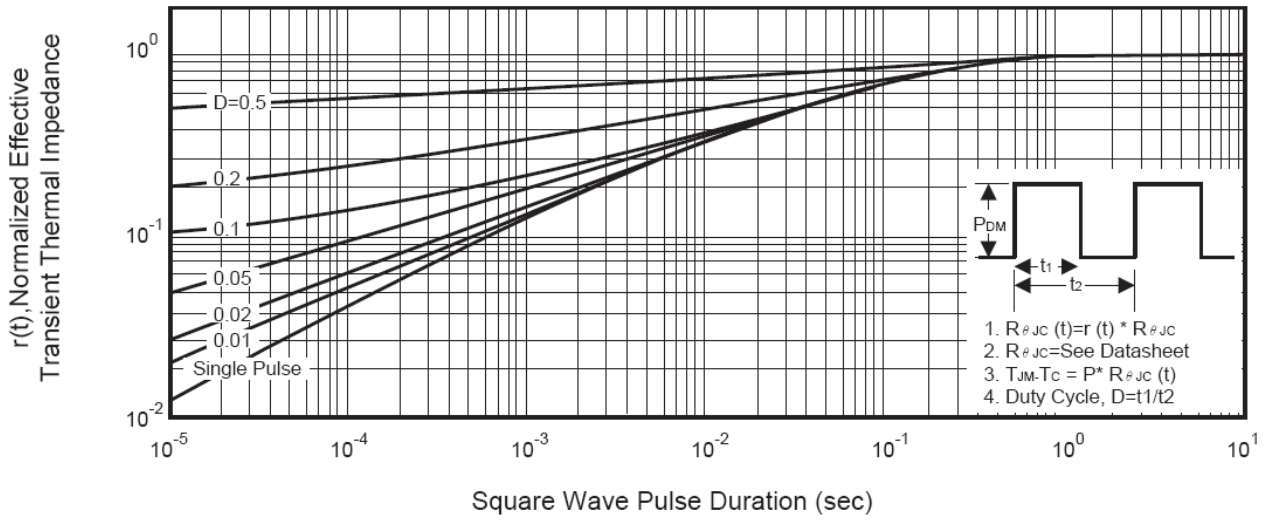
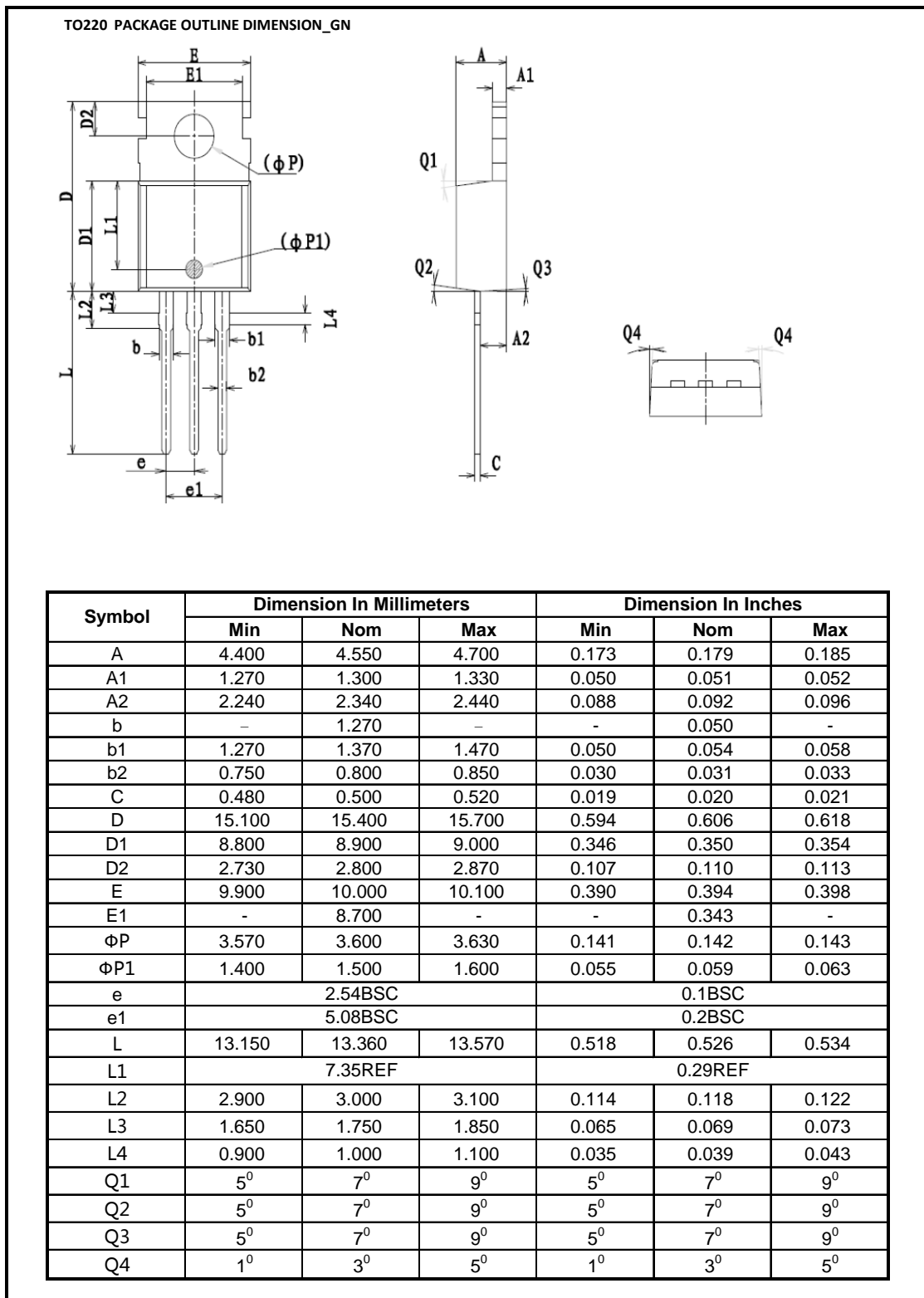


Figure 7: Normalized Thermal transient Impedance Curve

Mechanical Data:


Ordering and Marking Information
Device Marking: SSFT3904

Package (Available)
TO220
Operating Temperature Range
C : -55 to 175 °C

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)	$T_J=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_J=125^{\circ}\text{C}$ to 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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Customer Service**Worldwide Sales and Service:**

Sales@silikron.com

Technical Support:

Technical@silikron.com

Suzhou Silikron Semiconductor Corp.

Building 11A Suchun Industrial Square, 428# Xinglong Street, Suzhou P.R. China

TEL: (86-512) 62560688

FAX: (86-512) 65160705

E-mail: Sales@silikron.com