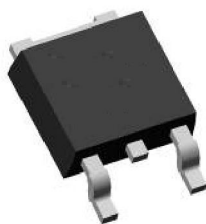
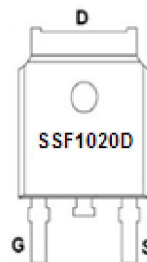


Main Product Characteristics

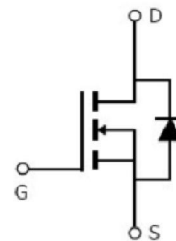
V_{DSS}	100V
$R_{DS(on)}$	16m Ω (typ.)
I_D	60A



DPAK



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°C operating temperature
- Lead free product



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
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	60	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	50	
I_{DM}	Pulsed Drain Current②	240	
$P_D @ TC = 25^\circ C$	Power Dissipation③	143	W
	Linear Derating Factor	2.0	W/°C
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH	240	mJ
I_{AS}	Avalanche Current @ L=0.3mH	39	A
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

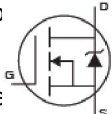
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	1.05	—	°C/W
$R_{\theta JA}$	Junction-to-ambient ^④	—	62	°C/W

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

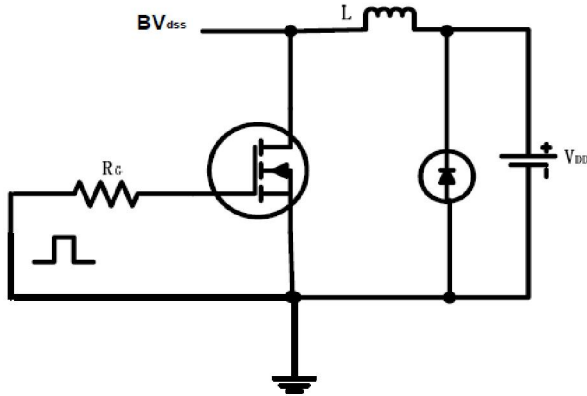
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	16	20	mΩ	$V_{GS}=10V, I_D = 30A$
$V_{GS(th)}$	Gate threshold voltage	2.0	3.0	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$ $T_J = 125^\circ\text{C}$
		—	2.0	—		
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 100V, V_{GS} = 0V$ $T_J = 150^\circ\text{C}$
		—	—	10		
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
Q_g	Total gate charge	—	90	—	nC	$I_D = 30A,$ $V_{DS}=30V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	14	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	24	—		
$t_{d(on)}$	Turn-on delay time	—	18.2	—	ns	$V_{GS}=10V, V_{DS}=30V,$ $R_L=15\Omega,$ $R_{GEN}=2.5\Omega$
t_r	Rise time	—	15.6	—		
$t_{d(off)}$	Turn-Off delay time	—	70.5	—		
t_f	Fall time	—	13.8	—		
C_{iss}	Input capacitance	—	3150	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$
C_{oss}	Output capacitance	—	300	—		
C_{rss}	Reverse transfer capacitance	—	240	—		

Source-Drain Ratings and Characteristics

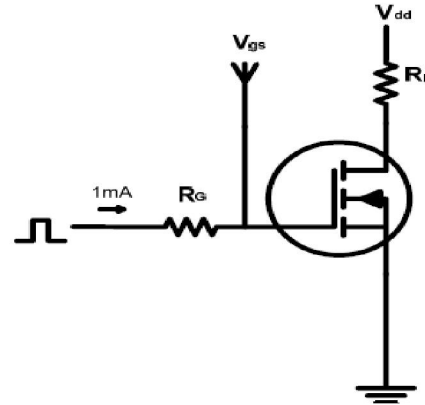
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	60	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	240	A	
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$I_S=30A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	57	—	ns	$T_J = 25^\circ\text{C}, I_F = 60A,$
Q_{rr}	Reverse Recovery Charge	—	107	—	nC	$di/dt = 100A/\mu s$

Test Circuits and Waveforms

EAS test circuits:



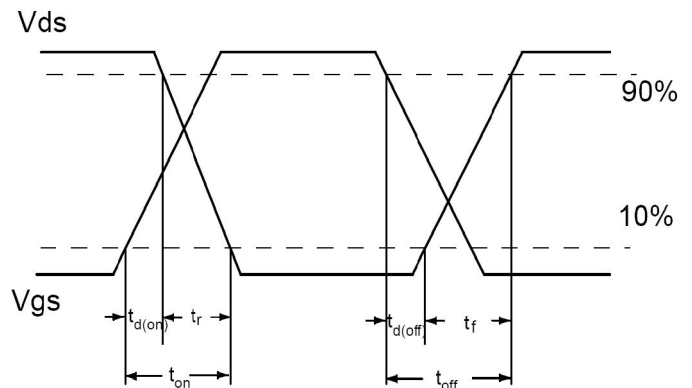
Gate charge test circuit:



Switch Time Test Circuit:



Switch 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 $T_{J(MAX)} = 175^\circ\text{C}$.
- ⑥ The maximum current rating is limited by bond-wires.

Typical Electrical and Thermal Characteristics

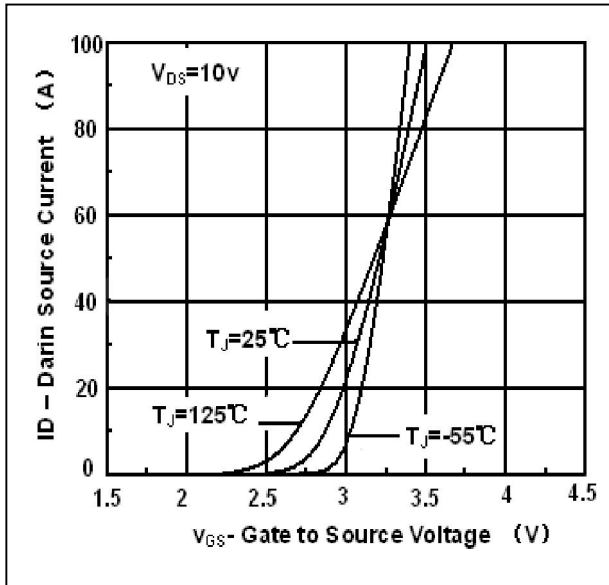


Figure 1, Transfer Characteristic

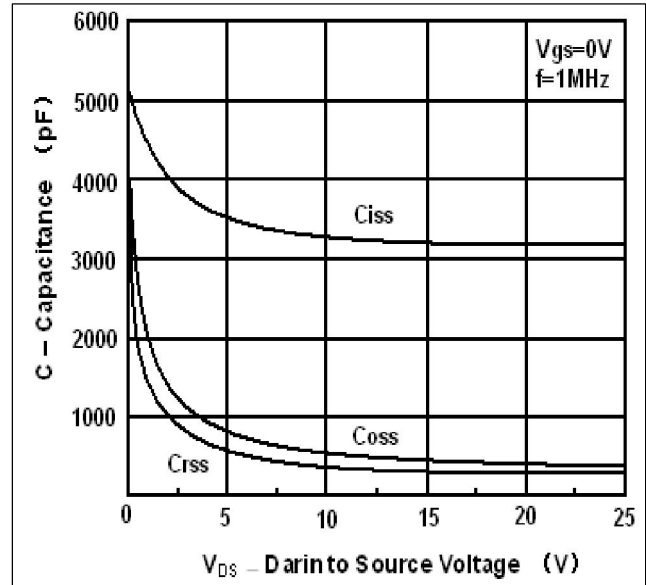


Figure 2, Capacitance

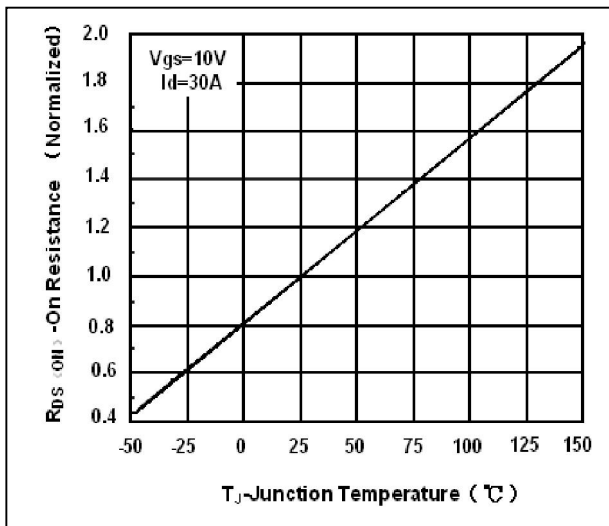


Figure 3, On Resistance vs. Junction Temperature

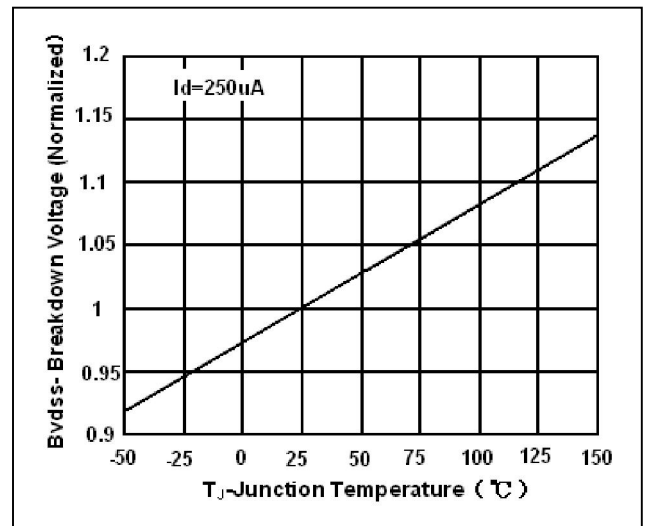


Figure 4, Breakdown Voltage vs. Junction Temperature

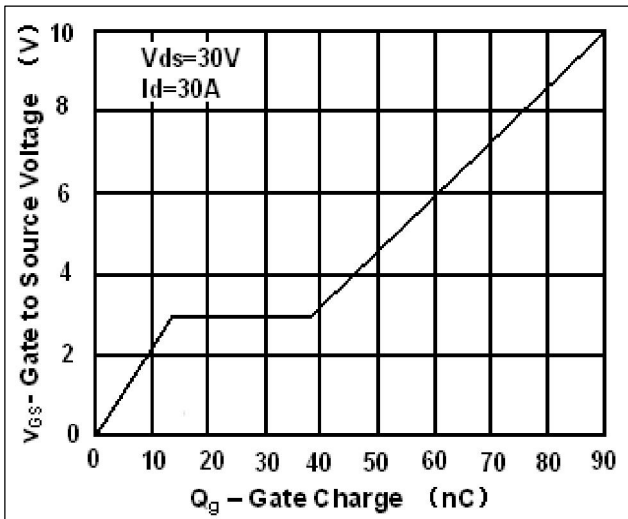


Figure 5, Gate Charge

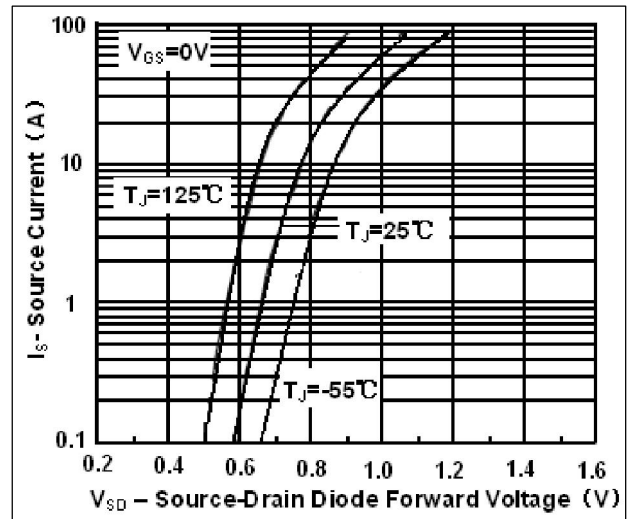


Figure 6, Source-Drain Diode Forward Voltage

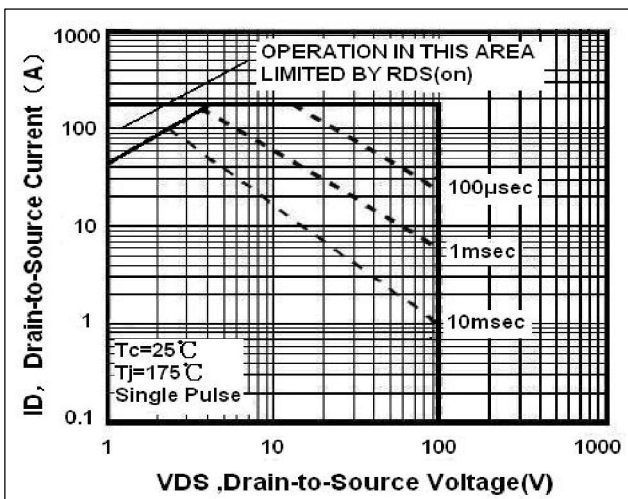


Figure 7. Safe Operation Area

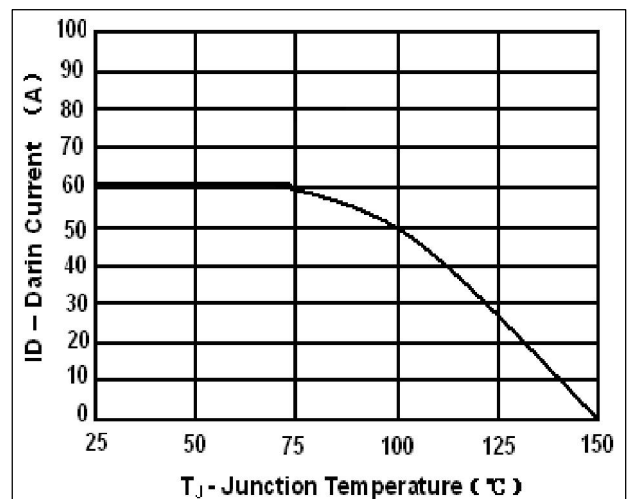


Figure 8. Max Drain Current vs. Junction Temperature

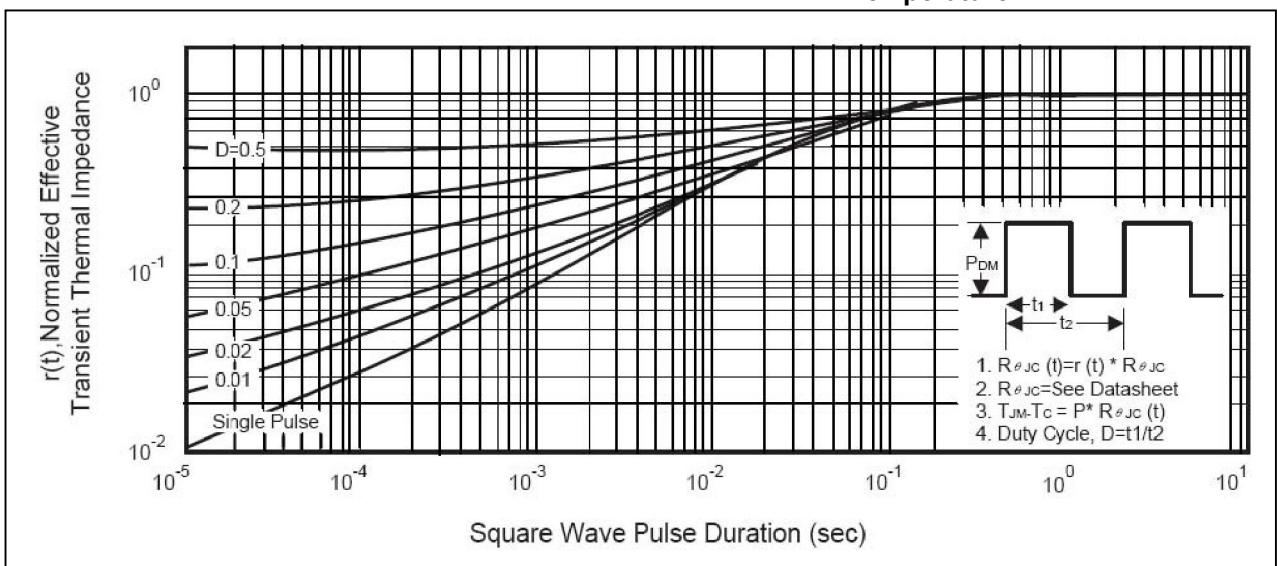
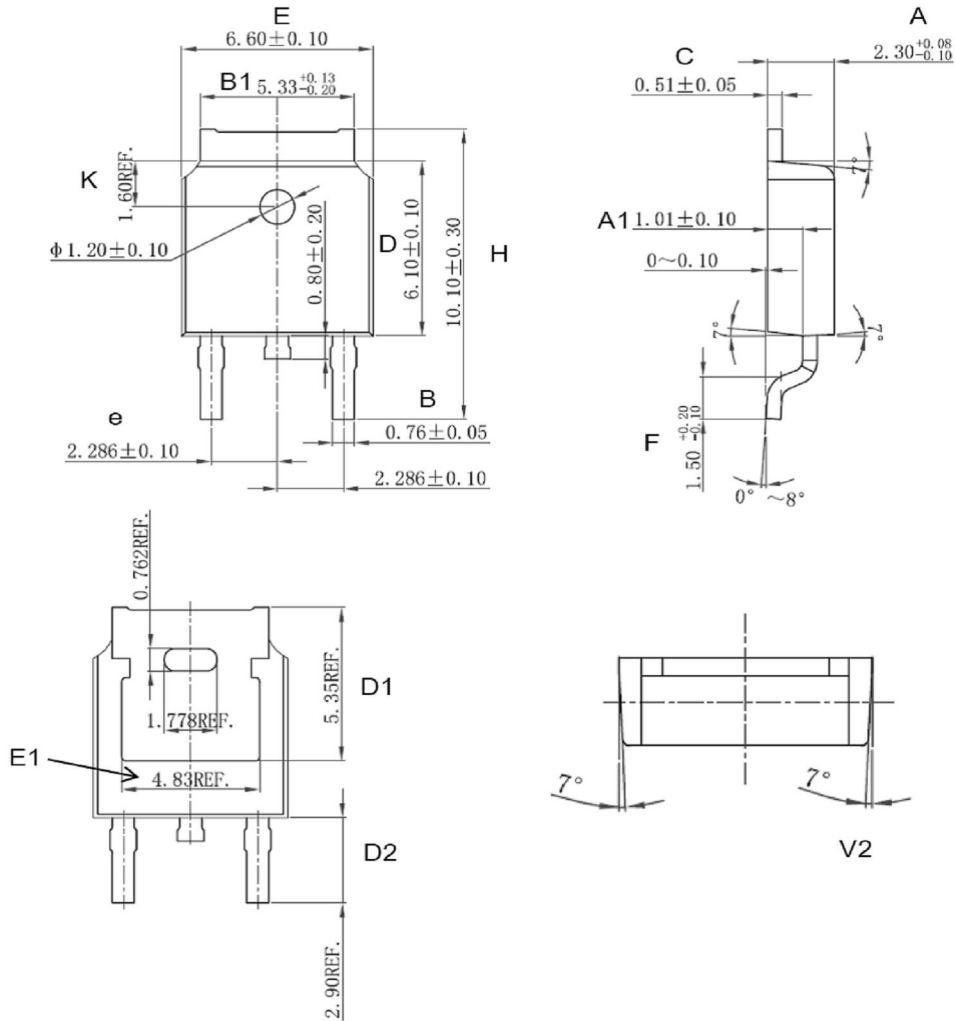


Figure 9. Transient Thermal Impedance Curve

Mechanical Data

DPAK PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.200	2.300	2.380	0.087	0.091	0.094
A1	0.910	1.010	1.110	0.036	0.040	0.044
B	0.710	0.760	0.810	0.028	0.030	0.032
B1	5.130	5.330	5.460	0.202	0.210	0.215
C	0.460	0.510	0.560	0.018	0.020	0.022
D	6.000	6.100	6.200	0.236	0.240	0.244
D1	5.350 (REF)			0.211 (REF)		
D2	2.900 (REF)			0.114 (REF)		
E	6.500	6.600	6.700	0.256	0.260	0.264
E1	4.83 (REF)			0.190 (REF)		
e	2.186	2.286	2.386	0.086	0.090	0.094
H	9.800	10.100	10.400	0.386	0.398	0.409
F	1.400	1.500	1.700	0.055	0.059	0.067
K	1.600 (REF)			0.063 (REF)		
V2	8° (REF)			8° (REF)		



Ordering and Marking Information

Device Marking: SSF1020D
Package (Available)
DPAK
Operating Temperature Range
C : -55 to 175 °C

Devices per Unit

Option1:

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

Option2:

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

Option3:

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

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)	$T_j=150^{\circ}\text{C}$ or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices