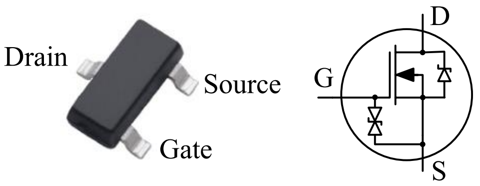
Depletion-Mode Power MOSFET

General Features

- ESD Improved Capability
- Depletion Mode (Normally On)
- Proprietary Advanced Planar Technology
- Rugged Polysilicon Gate Cell Structure
- Fast Switching Speed
- RoHS Compliant
- Halogen-free Available

BV_{DSX}	$R_{DS(ON)\ (Max.)}$	$I_{DSS\ (min)}$
150V	**15 Ω**	**200mA**

SOT-23



Applications

- New Energy Vehicles
- Industrial Automation
- Surge Protection
- Non-isolated Linear Power Supply
- Normally-on Switches
- Linear Amplifier
- Constant Current Source
- Telecom

Ordering Information

Part Number	Package	Marking	Remark
DMZ1520E	SOT-23	1520	Halogen Free

Absolute Maximum Ratings

T_A=25℃ unless otherwise specified

Symbol	Parameter	DMZ1520E	Unit
V_{DSX}	Drain-to-Source Voltage[1]	150	V
V_{DGX}	Drain-to-Gate Voltage[1]	150	V
I_D	Continuous Drain Current	0.2	A
I_{DM}	Pulsed Drain Current[2]	0.6	
P_D	Power Dissipation	0.50	W
V_{GS}	Gate-to-Source Voltage	±20	V
V_{ESD}	Gate to Source ESD[3]	1500	V
	Source to Gate ESD[3]	1500	V
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	℃
T_J and T_{STG}	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	DMZ1520E	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	250	K/W

Electrical Characteristics

OFF Characteristics

T_A =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	150	--	--	V	V_{GS}=-10V, I_D=250μA
$I_{D(OFF)}$	Drain-to-Source Leakage Current	--	--	10	μA	V_{DS}=150V，V_{GS}=-10V
		--	--	1.0	mA	V_{DS}=150V，V_{GS}=-10V T_J=125℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	±20	uA	V_{GS}=±20V, V_{DS}=0V

ON Characteristics

T_A =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{DSS}	Saturated Drain-to-Source Current	200	--	--	mA	V_{GS}=0V, V_{DS}=25V
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	10	15	Ω	V_{GS}=0V, I_D=100mA[4]
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	-3.5	--	-5.5	V	V_{DS}=3V, I_D=8μA
gfs	Forward Transconductance	--	0.24	--	S	V_{DS}=10V, I_D=100mA

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{ISS}	Input Capacitance	--	12.8	--	pF	V_{GS}=-10V V_{DS}=25V f=1.0MHZ
C_{OSS}	Output Capacitance	--	5.4	--		
C_{RSS}	Reverse Transfer Capacitance	--	3.3	--		
Q_G	Total Gate Charge	--	3	--	nC	V_{GS}=-10V~0V V_{DS}=75V, I_D=200mA
Q_{GS}	Gate-to-Source Charge	--	0.23	--		
Q_{GD}	Gate-to-Drain (Miller) Charge	--	1.1	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	7	--	ns	V_{GS}=-10V~0V V_{DD}=75V, I_D=200mA R_G=20Ohm
t_{rise}	Rise Time	--	16	--		
$t_{d(off)}$	Turn-off Delay Time	--	25	--		
t_{fall}	Fall Time	--	120	--		

Source-Drain Diode Characteristics

T_A=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Units	Test Conditions
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_{SD}=200mA, V_{GS}=-10V

NOTE：

[1] T_J=+25℃ to +150℃
[2] Repetitive rating, pulse width limited by maximum junction temperature.
[3]The test is based on JEDEC EIA/JESD22-A114(HBM).
[4] Pulse width≤380μs; duty cycle≤2%.

Typical Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

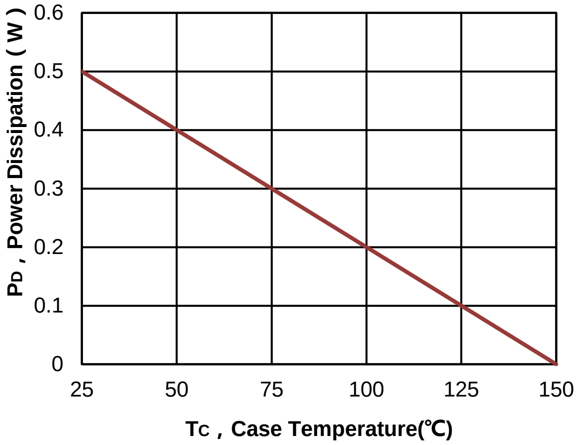


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

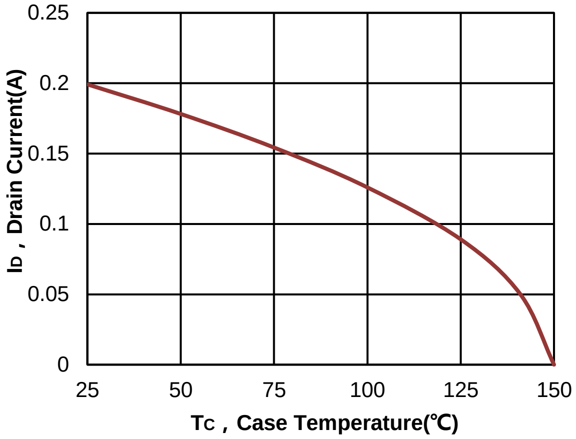


Figure 3.Typical Output Characteristics

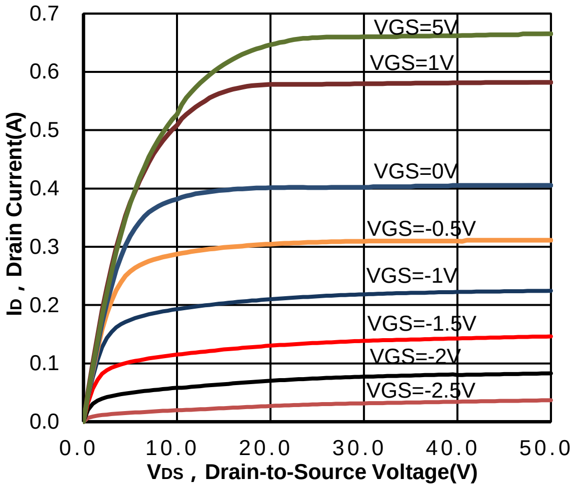


Figure 4. Typical Transfer Characteristics

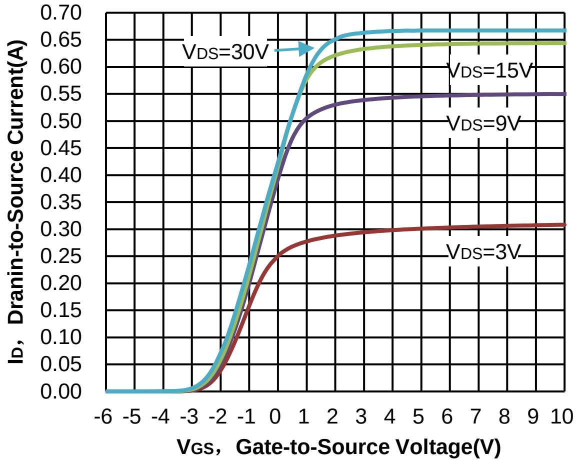


Figure 5. Maximum Rated Safe Operating Area

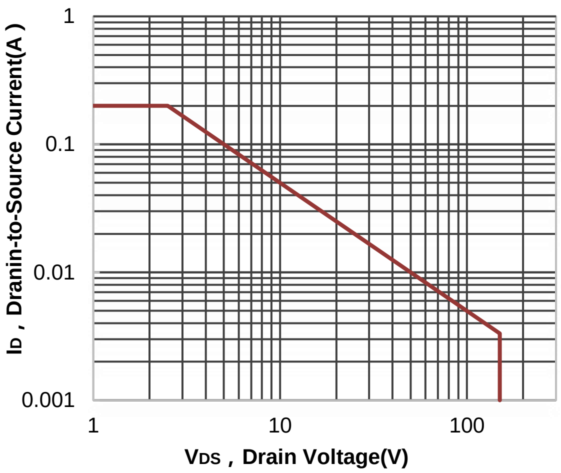
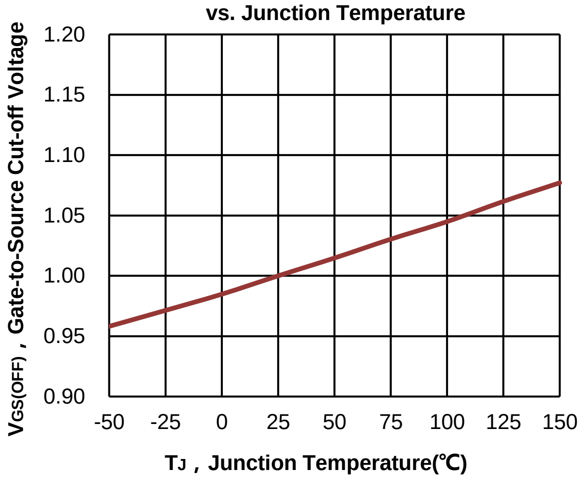


Figure 6. Typical Gate-to-Source Cut-off Voltage vs. Junction Temperature



Typical Application

In the application circuits of industrial automation, automotive electronics, and new energy, DMZ1520E can be used to power LDO. As shown in Figure 7, only one DMZ1520E is used in the circuit, which can convert the high input voltage into a stable low voltage to supply power to the LDO, and at the same time provide transient surge suppression for the LDO. The input voltage and output voltage of the LDO satisfy the relationship: $V_s=V_{out}+|V_{GS(OFF)}|$. The circuit has a fast response speed, a simple structure, and can effectively save costs.

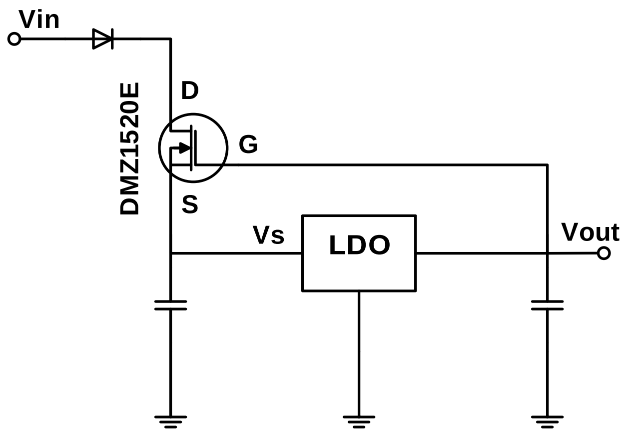


Figure 7. The Circuit of DMZ1520E to power supply for LDO

Using the sub-threshold characteristics of the DMZ1520E, it can form a stable current source with the resistor R. Its basic application is shown in Figure 8:

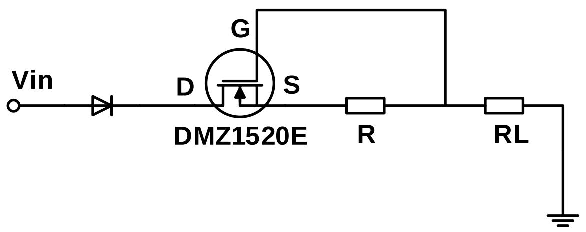
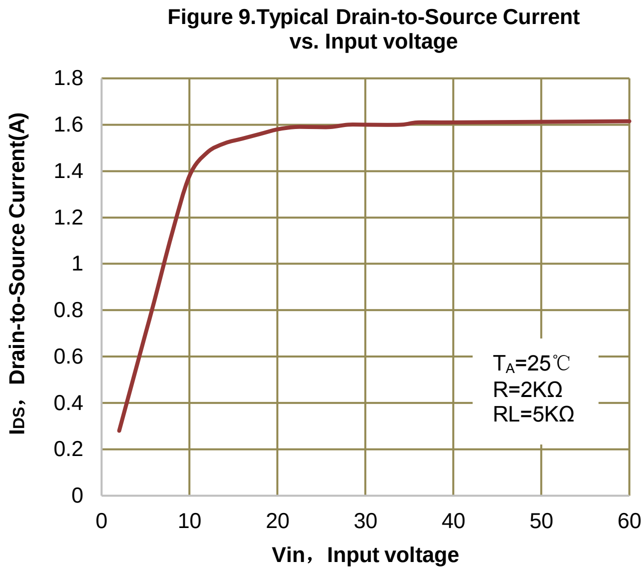


Figure 8. The Circuit of DMZ1520E and resistor form constant current source

Using the sample with $V_{GS(OFF)}$=-4.3V（@V_{DS}=3V, I_{DS}=8uA）to test according to the circuit shown in Figure 8, the result is shown in Figure 9：



In the Type-C/PD charger circuit, DMZ1520E and resistor R form a constant current source, which supplies stable power to InnoSwitch. The structure of the circuit is simple, and the DMZ1520E can also provide transient surge suppression for InnoSwitch. The circuit is shown in Figure 10:

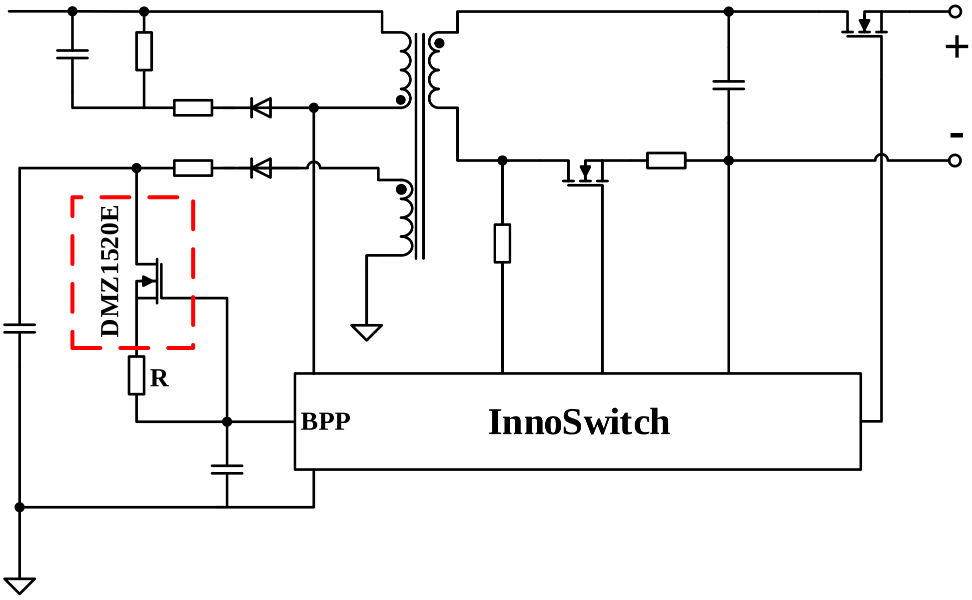
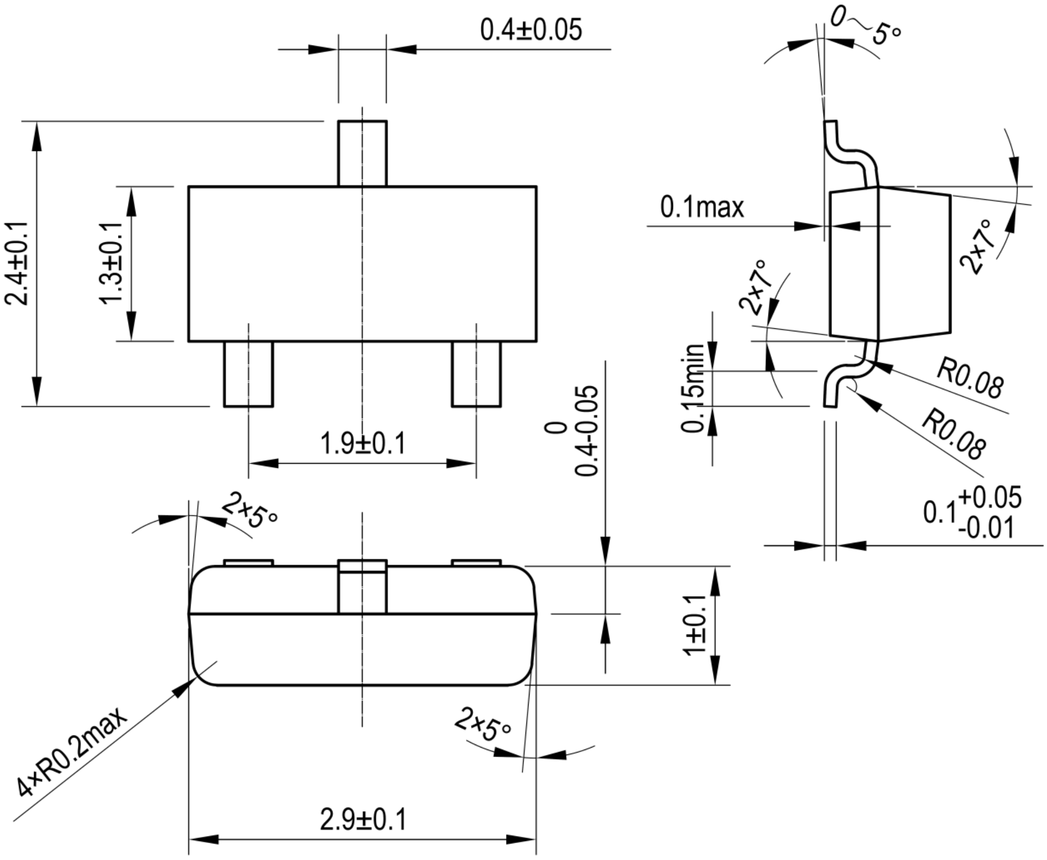


Figure 10. Constant current source circuit with DMZ1520E

Package Dimensions

SOT-23



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