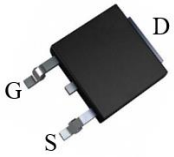
Depletion-Mode Power MOSFET

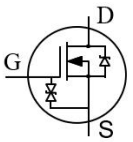
General Features

- Depletion Mode (Normally On)
- Proprietary Advanced Planar Technology
- Rugged Polysilicon Gate Cell Structure
- RoHS Compliant
- Halogen-free Available

BV_{DSX}	$R_{DS(ON)(Max.)}$	I_D
450V	**2Ω**	**3.75A**

TO-252





Applications

- Transient Protect
- Start-up
- Converters
- Normally On Switches
- LED Drive Circuits
- Power Supplies
- Current Source
- Voltage Source

Ordering Information

Part Number	Package	Marking	Remark
DMD4523E	TO-252	4523E	Halogen Free

Absolute Maximum Ratings

T_A=25℃unless otherwise specified

Symbol	Parameter	DMD4523E	Unit
V_{DSX}	Drain-to-Source Voltage[1]	450	V
V_{DGX}	Drain-to-Gate Voltage[1]	450	V
I_D	Continuous Drain Current	3.75	A
I_{DM}	Pulsed Drain Current[2]	15	
P_D	Power Dissipation	36	W
V_{GS}	Gate-to-Source Voltage	±20	V
V_{ESD}	Gate Source ESD[3]	3000	V
	Source to Gate ESD[3]	3000	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	DMD4523E	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.47	℃/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	450	--	--	V	V_{GS}=-10V, I_D=250μA
$I_{DS(OFF)}$	Drain-to-Source Leakage Current	--	--	1	μA	V_{DS}=450V, V_{GS}=-10V
I_{GSS}	Gate-to-Source Leakage Current	--	--	20	μA	V_{GS}=+20V, V_{DS}=0V
		--	--	-20		V_{GS}=-20V, V_{DS}=0V

ON Characteristics

T_A =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	--	2	Ω	V_{GS}=0V, I_D=1A[4]
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	-1.7	--	-4.0	V	V_{DS}=3V, I_D=8μA
gfs	Forward Transconductance	--	3100	--	mS	V_{DS}=5V, I_D=1A[4]

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{ISS}	Input Capacitance	--	1.11	--	pF	V_{GS}=-7V V_{DS}=25V f=1.0MHZ
C_{OSS}	Output Capacitance	--	62.80	--		
C_{RSS}	Reverse Transfer Capacitance	--	6.54	--		
Q_G	Total Gate Charge	--	158.82	--	nC	V_{GS}=-6V~0V V_{DD}=25V I_D=200mA
Q_{GS}	Gate-to-Source Charge	--	58.26	--		
Q_{GD}	Gate-to-Drain (Miller) Charge	--	50.55	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	5.71	--	ns	V_{GS}=-6V~0V V_{DD}=25V I_D=200mA R_G=10 Ω
t_{rise}	Rise Time	--	18.45	--		
$t_{d(off)}$	Turn-off Delay Time	--	26.40	--		
t_{fall}	Fall Time	--	18.46	--		

Source-Drain Diode Characteristics

T_A=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Units	Test Conditions
V_{SD}	Diode Forward Voltage	--	0.8	1.5	V	I_{SD}=200mA[4] ,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

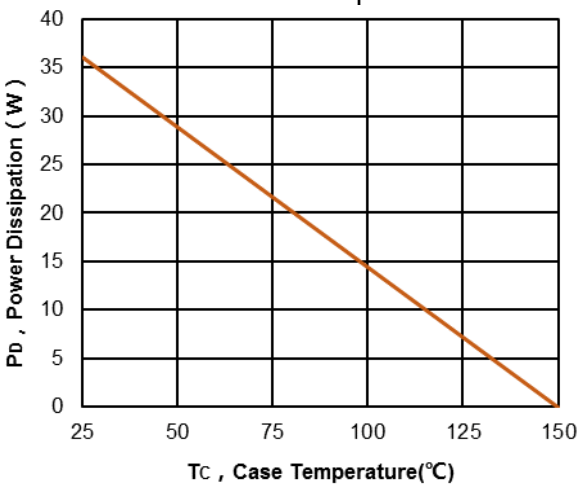


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

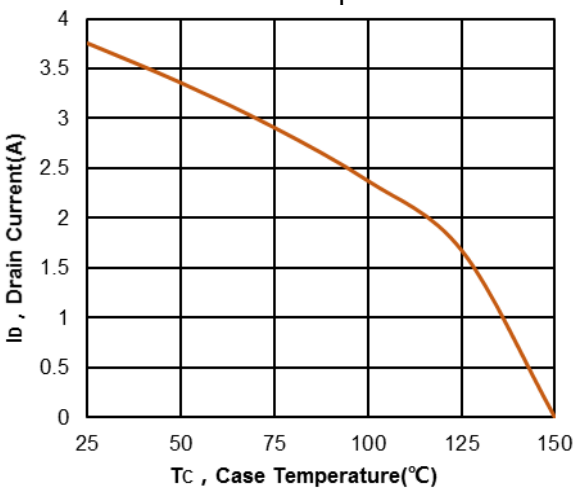


Figure 3.Typical Output Characteristics

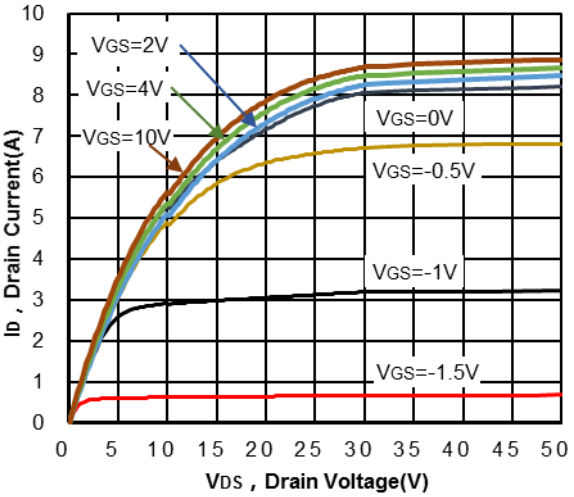


Figure 4. Typical Transfer Characteristics

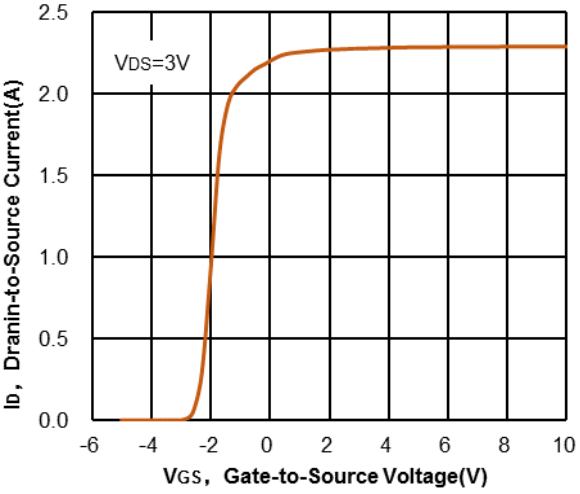


Figure 5. Typical Capacitance vs. Drain-to-Source Voltag

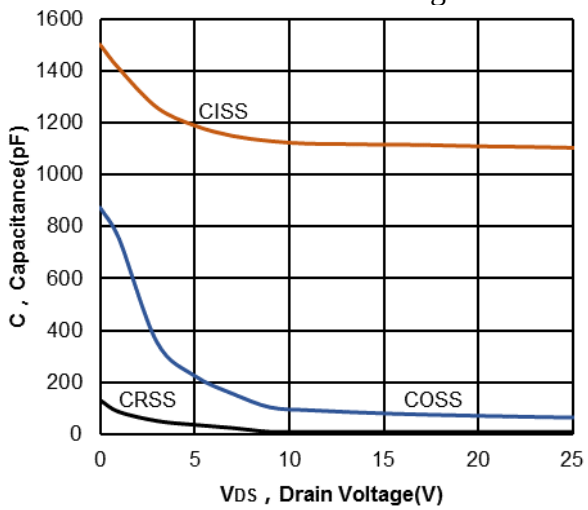
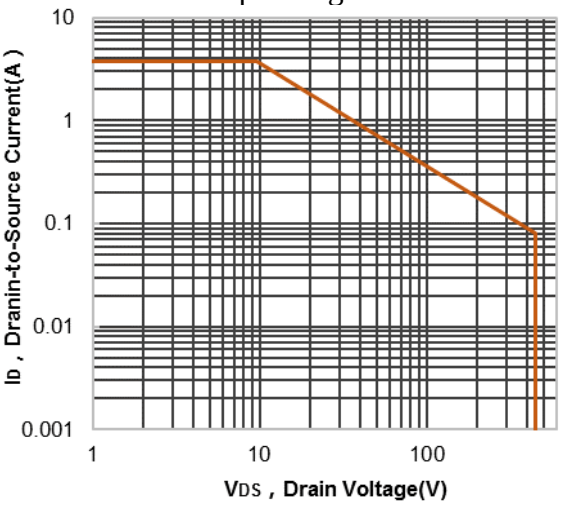


Figure 6. Maximum Rated Safe Operating Area



Typical Application

In circuits of capacitive loads, instruments, and communication equipment, using DMD4523E can effectively suppress transient surges and provide overcurrent protection. As shown in Figure 7, In the circuit, only one depletion mode MOSFET and a resistor are used to limit the magnitude of the current flowing through the load and provide overcurrent protection. The application of DMD4523E has the characteristics of fast response speed, simple circuit structure and low cost.

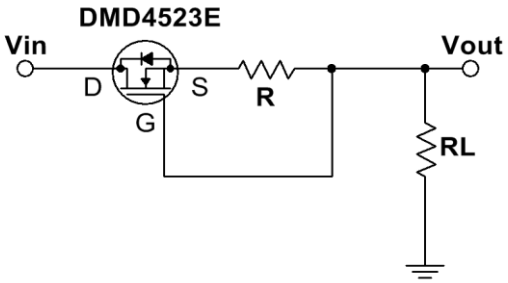


Figure 7. The DMD4523E is used for current limiting

In Figure 8, by selecting an appropriate Zener diode VD1, a stable output voltage Vout can be obtained. The DMD4523E can work under higher voltage, it can provide overvoltage protection and transient surge suppression for the load.

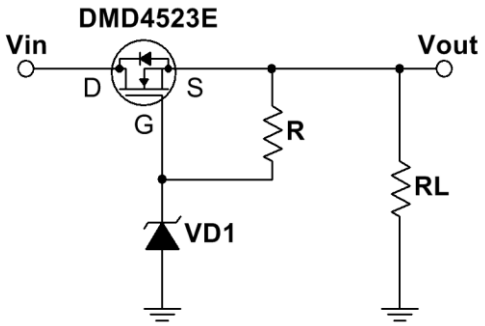
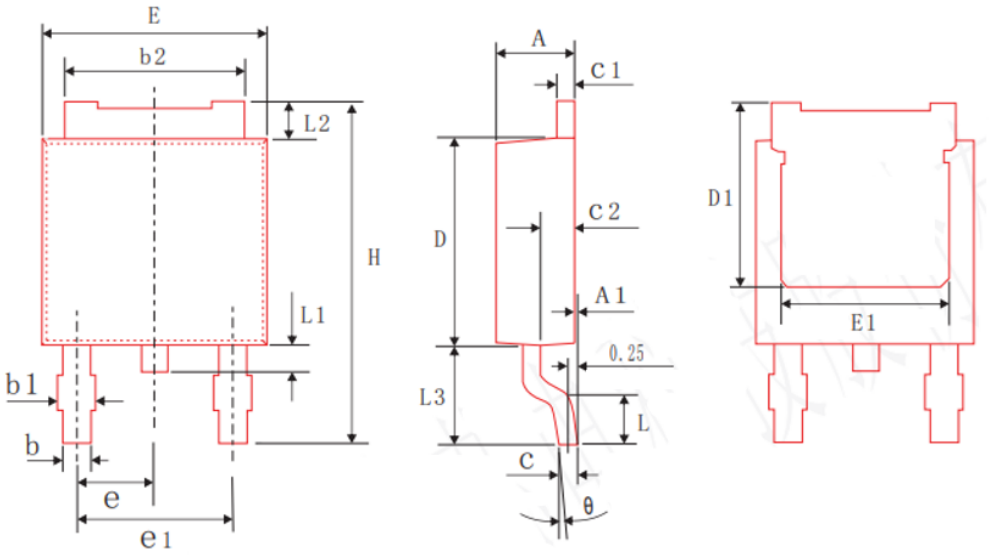


Figure 8. The DMD4523E for overcurrent and overvoltage protection

Package Dimensions

TO-252



SYMBOL	MIN	NOM	MAX
A	2.2	2.3	2.4
A1	0.00	0.05	0.10
b	0.762	0.812	0.862
b1	--	--	1.10
b2	5.23	5.33	5.43
c	0.458	1.508	0.558
c1	0.458	0.508	0.558
c2	0.80	1.00	1.20
D	6.00	6.10	6.20
D1	5.25	5.45	5.65
H	10.00	10.10	10.20
E	6.50	6.60	6.70
E1	4.75	4.85	4.95
e1	4.37	4.57	4.77
L	--	--	1.45
L1	0.60	0.75	0.90
L2	0.90	1.10	1.30
L3	2.80	3.00	3.20
θ	0°	4°	8°
e		2.285 BSC	

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