

Depletion-Mode Power MOSFET

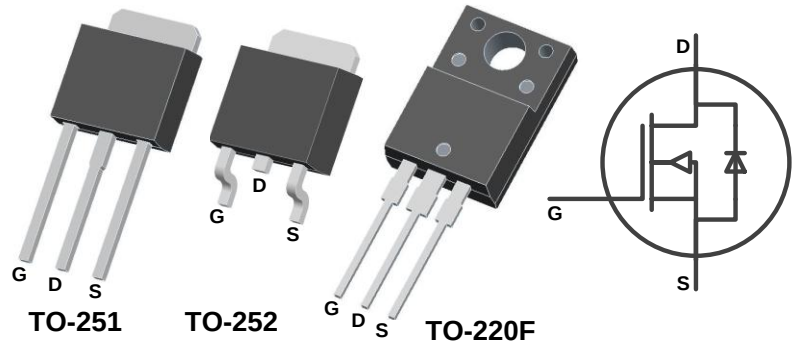
General Features

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

BV_{DSX}	$R_{DS(ON)} (Max.)$	$I_{DSS,min}$
450V	2.2 Ω	2A

Applications

- Suppressing surge current
- Normally-on Switches
- Converters
- Synchronous Rectification
- Linear Amplifier
- Constant Current Source



Ordering Information

Part Number	Package	Marking	Remark
DMU4523D	TO-251	4523D	Halogen Free
DMD4523D	TO-252	4523D	Halogen Free
DMA4523D	TO-220F	DMA4523D	RoHS

Absolute Maximum Ratings

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

Symbol	Parameter	DMU4523D/DMD4523D	DMA4523D	Unit
V _{DSX}	Drain-to-Source Voltage ^[1]	450		V
V _{DGX}	Drain-to-Gate Voltage ^[1]	450		V
I _D	Continuous Drain Current	2.5		A
I _{DM}	Pulsed Drain Current ^[2]	10		
P _D	Power Dissipation	89	22	W
	Derating Factor above 25°C	0.71	0.18	W/°C
V _{GS}	Gate-to-Source Voltage	±20		V
T _L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300		°C
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	DMU4523D/DMD4523D	DMA4523D	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.4	5.5	K/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	60	

Electrical Characteristics

OFF Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	450	--	--	V	$V_{GS} = -5V, I_D = 250\mu A$
$I_{D(OFF)}$	Drain-to-Source Leakage Current	--	--	0.1	μA	$V_{DS} = 450V, V_{GS} = -5V$
		--	--	1	mA	$V_{DS} = 450V, V_{GS} = -5V$ $T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	100	nA	$V_{GS} = +20V, V_{DS} = 0V$
		--	--	-100		$V_{GS} = -20V, V_{DS} = 0V$

ON Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{DSS}	Saturated Drain-to-Source Current	2	--	--	A	$V_{GS} = 0V, V_{DS} = 25V$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	--	2.2	Ω	$V_{GS} = 0V, I_D = 2A^{[3]}$
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	-2.4	--	-1.2	V	$V_{DS} = 3V, I_D = 8\mu A$
gfs	Forward Transconductance	--	7.7	--	S	$V_{DS} = 10V, I_D = 2A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{ISS}	Input Capacitance	--	423	--	pF	$V_{GS} = -5V$ $V_{DS} = 25V$ $f = 1.0MHz$
C_{OSS}	Output Capacitance	--	47	--		
C_{RSS}	Reverse Transfer Capacitance	--	13	--		
Q_G	Total Gate Charge	--	14.7	--	nC	$V_{GS} = -5V \sim 5V$ $V_{DS} = 225V, I_D = 2A$
Q_{GS}	Gate-to-Source Charge	--	2.1	--		
Q_{GD}	Gate-to-Drain (Miller) Charge	--	7.0	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	30	--	ns	$V_{GS} = -5V \sim 5V$ $V_{DD} = 225V, I_D = 2A$ $R_G = 20\Omega$
t_{rise}	Rise Time	--	150	--		
$t_{d(OFF)}$	Turn-off Delay Time	--	180	--		
t_{fall}	Fall Time	--	170	--		

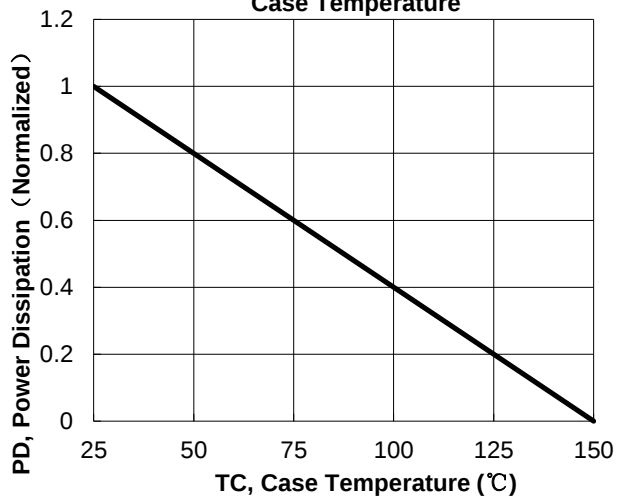
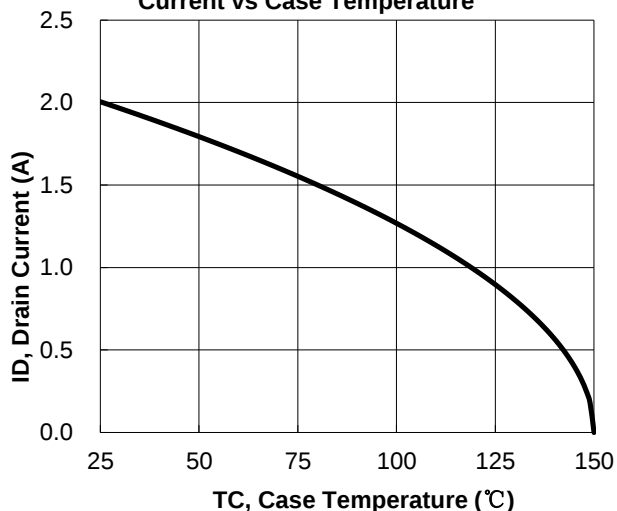
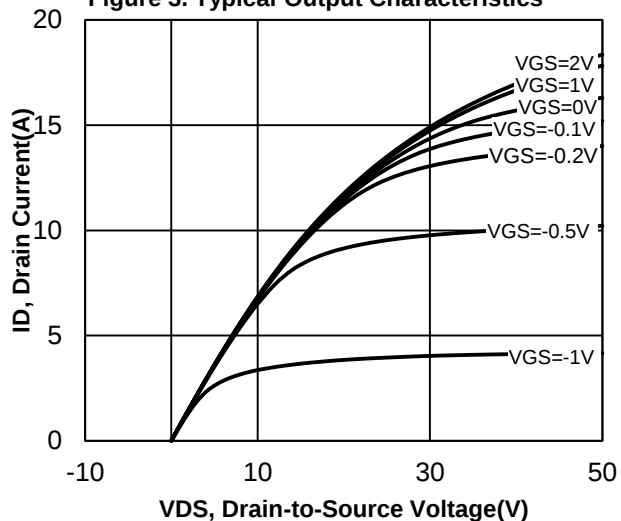
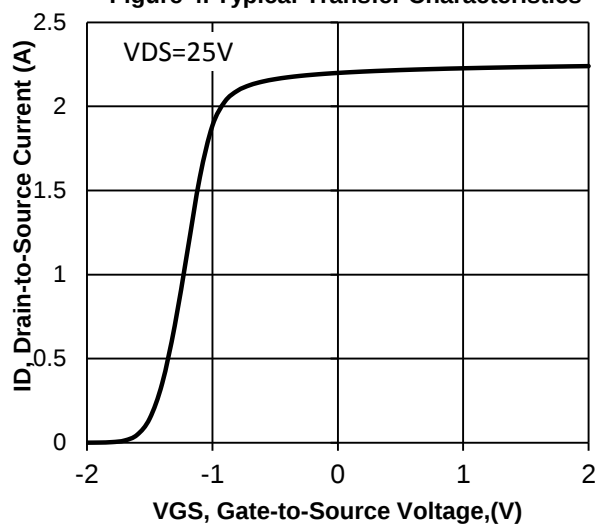
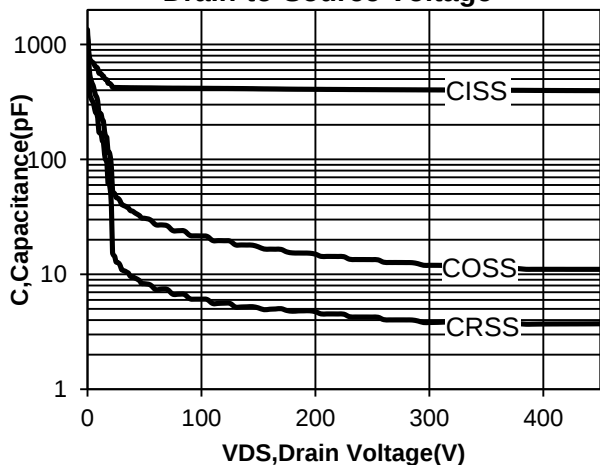
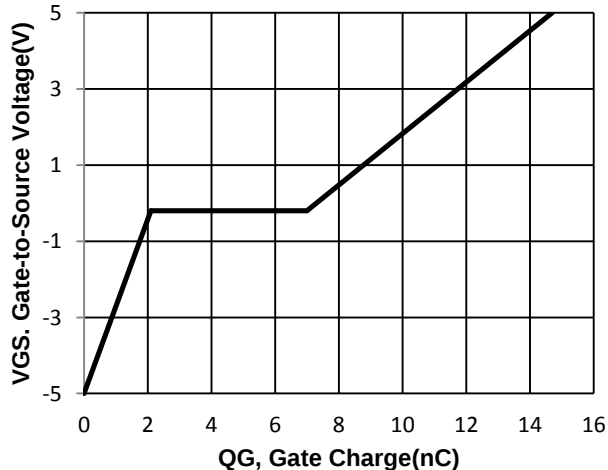
Source-Drain Diode Characteristics $T_A = 25^\circ\text{C}$ unless otherwise specified

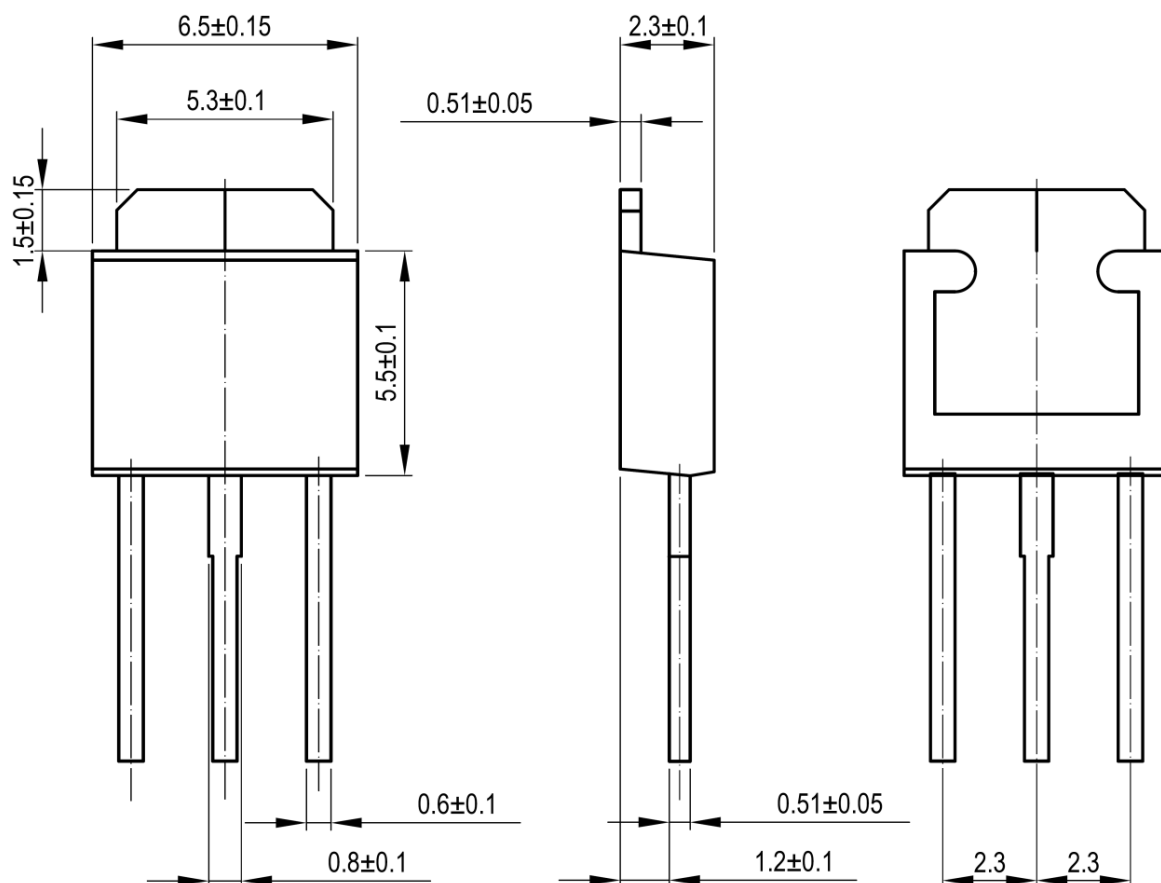
Symbol	Parameter	Min	Typ.	Max.	Units	Test Conditions
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_{SD} = 1.0\text{ A}$, $V_{GS} = -10\text{ V}$

NOTE:[1] $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$

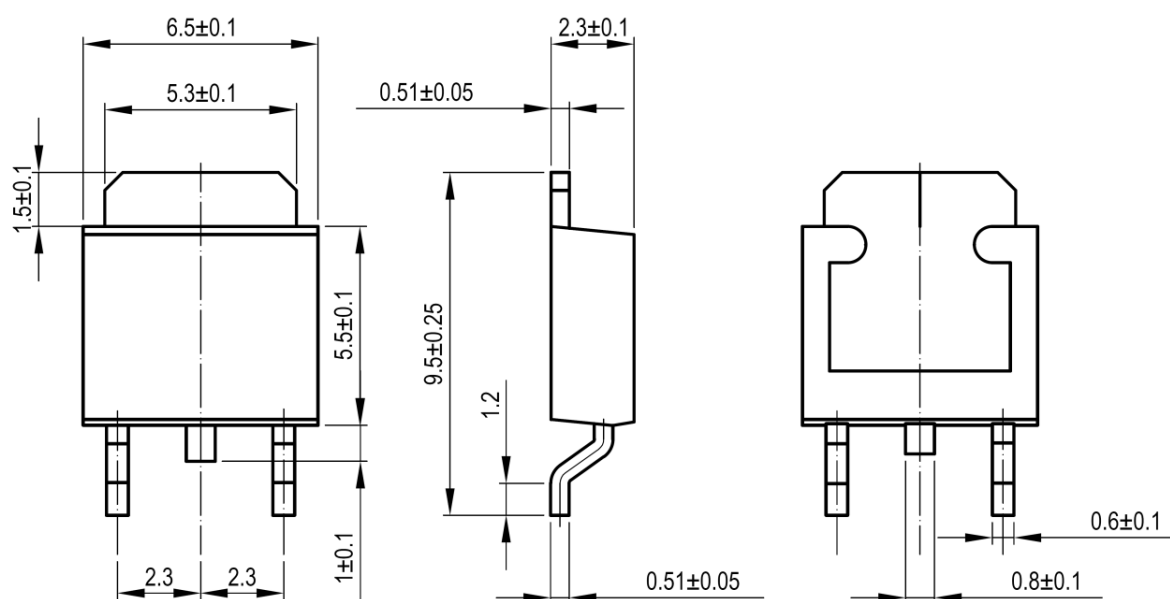
[2] Repetitive rating, pulse width limited by maximum junction temperature.

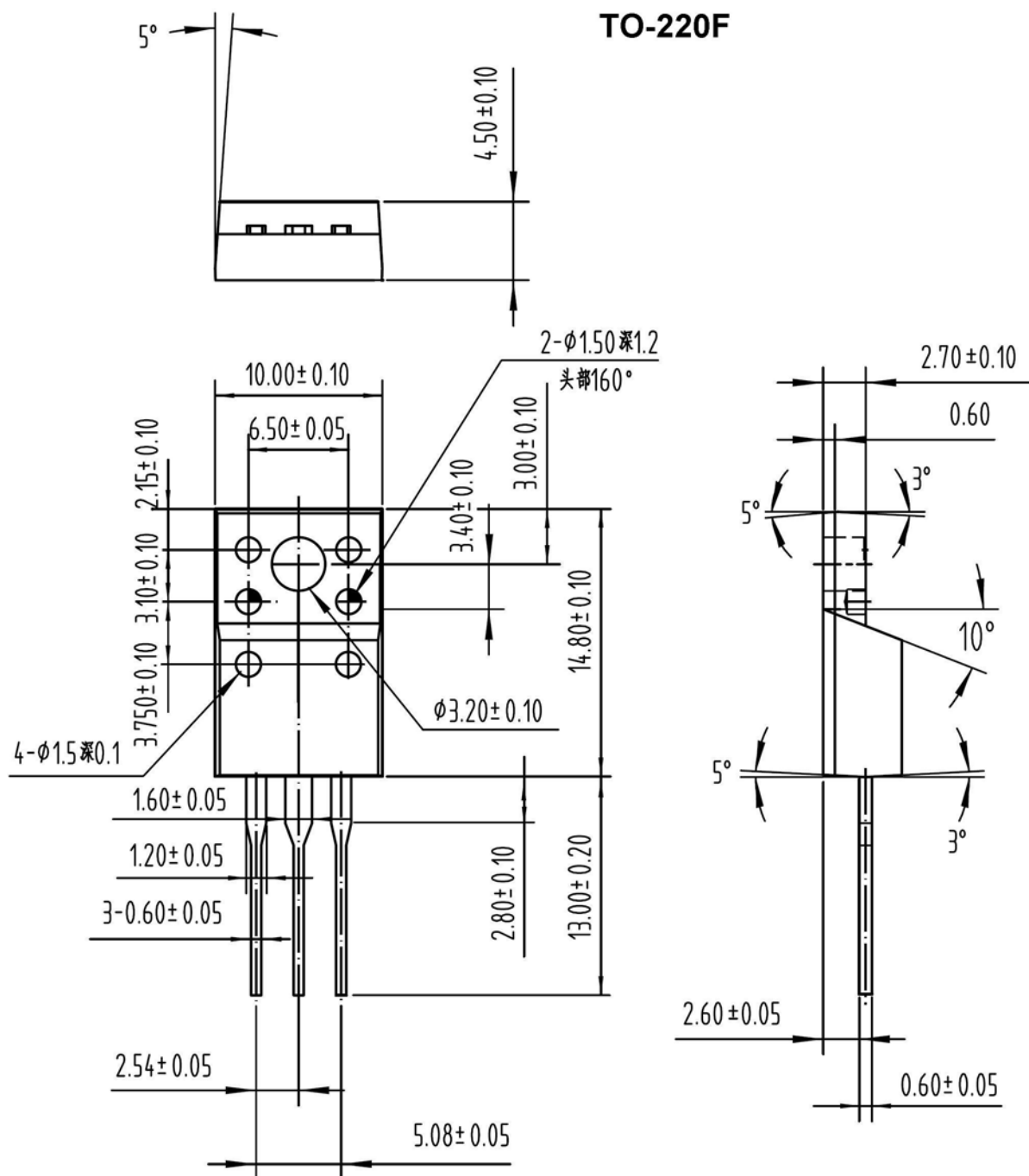
[3] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.

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 Voltage

Figure 6. Typical Gate Charge vs. Gate-to-Source Voltage


Package Dimensions
TO-251


TO-252





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