



May 1999

MTP3055V

N-Channel Enhancement Mode Field Effect Transistor

General Description

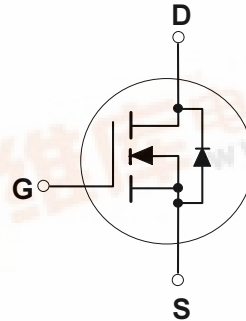
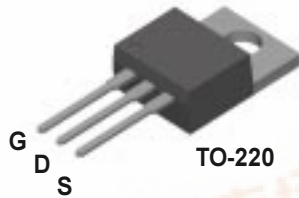
This N-Channel MOSFET has been designed specifically for low voltage, high speed switching applications i.e. power supplies and power motor controls.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications.

The result is a MOSFET that is easy and safer to drive (even at very high frequencies).

Features

- 12 A, 60 V. $R_{DS(ON)} = 0.150 \Omega @ V_{GS} = 10 \text{ V}$
- Critical DC electrical parameters specified at elevated temperature.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- 175°C maximum junction temperature rating.



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous	12	A
	- Pulsed	37	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	48	W
	Derate above 25°C	0.32	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-65 to +175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to- Case	3.13	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to- Ambient (Note 1)	62.5	$^\circ\text{C}/\text{W}$

Package Outlines and Ordering Information

Device Marking	Device	Package Information	Quantity
MTP3055V	MTP3055V	Rails/Tubes	45 units

*Die and manufacturing source subject to change without prior notification.



Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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DRAIN-SOURCE AVALANCHE RATINGS (Note 2)

W_{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 25\text{ V}, I_D = 12\text{ A}$			72	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				12	A

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		63		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	μA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$			100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	3	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-5		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 6\text{ A}$			0.150	Ω
$V_{DS(on)}$	Drain Source On-Voltage	$I_D = 12\text{ A}, V_{GS} = 10\text{ V}$			2.2	V
g_{FS}	Forward Transconductance	$V_{DS} = 7\text{ V}, I_D = 6\text{ A}$	4.0			S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$			500	pF
C_{oss}	Output Capacitance				180	pF
C_{riss}	Reverse Transfer Capacitance				50	pF

Switching Characteristics (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 12\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 9.1\ \Omega$			16	ns
t_r	Turn-On Rise Time				38	ns
$t_{d(off)}$	Turn-Off Delay Time				80	ns
t_f	Turn-Off Fall Time				45	ns
Q_g	Total Gate Charge	$V_{DS} = 48\text{ V},$ $I_D = 12\text{ A}, V_{GS} = 10\text{ V}$			17	nC
Q_{gs}	Gate-Source Charge			2.3		nC
Q_{gd}	Gate-Drain Charge			2.6		nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current (Note 2)				12	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current (Note 2)				37	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 12\text{ A}$ (Note 2)			1.6	V

Notes:

- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance.
- Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$

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