

# MTP3055VL

## N-Channel Logic Level Enhancement Mode Field Effect Transistor

### General Description

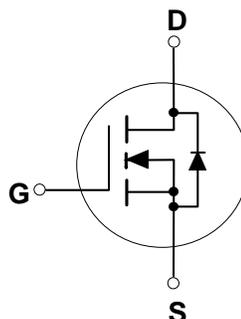
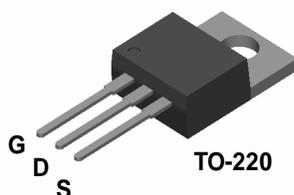
This N-Channel Logic Level MOSFET has been designed specifically for low voltage, high speed switching applications i.e. power supplies and power motor controls.

This MOSFET features 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.  $R_{DS(ON)} = 0.18 \Omega @ V_{GS} = 5 \text{ V}$
- Critical DC electrical parameters specified at elevated temperature.
- Low drive requirements allowing operation directly from logic drivers.  $V_{GS(th)} < 2 \text{ V}$ .
- 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	$\pm 15$	V
$I_D$	Drain Current - Continuous	12	A
	- Pulsed	42	
$P_D$	Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	48	W
		0.32	W/ $^\circ\text{C}$
$T_J, T_{STG}$	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
MTP3055VL	MTP3055VL	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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		55		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$			10 100	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 15\text{ V}, V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -15\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

**On Characteristics** (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	1.6	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		-4		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 5\text{ V}, I_D = 6\text{ A}$		0.100	0.180	$\Omega$
$V_{DS(on)}$	Drain-Source On-Voltage On-Resistance	$V_{GS} = 5\text{ V}, I_D = 12\text{ A}$			2.6	V
$g_{FS}$	Forward Transconductance	$V_{DS} = 8\text{ V}, I_D = 6\text{ A}$	5	8.7		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		345	570	pF
$C_{oss}$	Output Capacitance			110	160	pF
$C_{rss}$	Reverse Transfer Capacitance			30	40	pF

**Switching Characteristics** (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 12\text{ A},$ $V_{GS} = 5\text{ V}, R_{GEN} = 9.1\text{ }\Omega$			20	ns
$t_r$	Turn-On Rise Time				190	ns
$t_{d(off)}$	Turn-Off Delay Time				30	ns
$t_f$	Turn-Off Fall Time				90	ns
$Q_g$	Total Gate Charge	$V_{DS} = 48\text{ V},$ $I_D = 12\text{ A}, V_{GS} = 5\text{ V}$		7.8	10	nC
$Q_{gs}$	Gate-Source Charge			1.7		nC
$Q_{gd}$	Gate-Drain Charge			3.2		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)			42	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 12\text{ A}$ (Note 2)			1.3	V
$t_{rr}$	Drain-Source Reverse Recovery Time	$I_F = 12\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		55		nS

**Notes:**

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

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