

MOSFET – N-Channel, Field Effect Transistor, Enhancement Mode, Logic Level

60 V, 12 A, 0.18 Ω

MTP3055VL

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. $R_{DS(ON)} = 18 \Omega @ V_{GS} = 5 \text{ V}$
- 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
- This is a Pb-Free and Halide Free Device

MAXIMUM RATINGS ($T_C = 25 \text{ °C}$ unless otherwise noted)

Symbol	Rating	Value	Unit
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Drain-Source Voltage	± 15	V
I_D	Drain Current	– Continuous	12 A
		– Pulsed	42 A
P_D	Power Dissipation	@ $T_C = 25 \text{ °C}$	48 W
		Derate above 25 °C	0.32 W/°C
T_J, T_{STG}	Operating and Storage Junction Temperature Range	–65 to +175	°C

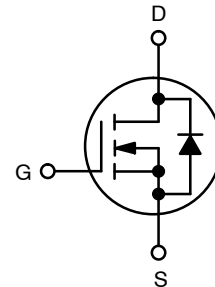
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

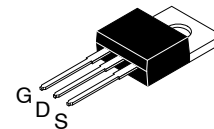
Symbol	Rating	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.13	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	62.5	°C/W

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance.

V_{DSS}	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	0.18 $\Omega @ 5 \text{ V}$	12 A



N-CHANNEL MOSFET



**TO-220-3LD
CASE 340AT**

MARKING DIAGRAM

MTP
3055VL
AYWWZZ

MTP3055VL = Specific Device Code
A = Assembly Location
YWW = Date Code (Year & Week)
ZZ = Assembly Lot

ORDERING INFORMATION

Device	Package	Shipping
MTP3055VL	TO-220-3LD	800 Units / Tube

MTP3055VL

ELECTRICAL CHARACTERISTICS (T_C = 25 °C unless otherwise specified)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
--------	-----------	-----------	-----	-----	-----	------

DRAIN-SOURCE AVALANCHE RATINGS (Note 2)

W _{DSS}	Single Pulse Drain-Source Avalanche Energy	V _{DD} = 25 V, I _D = 12 A	–	–	72	mJ
I _{AR}	Maximum Drain-Source Avalanche Current		–	–	12	A

OFF CHARACTERISTICS

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25 °C	–	55	–	mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V	–	–	10	μA
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 150 °C	–	–	100	
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 15 V, V _{DS} = 0 V	–	–	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = –15 V, V _{DS} = 0 V	–	–	–100	nA

ON CHARACTERISTICS (Note 2)

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	1	1.6	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25 °C	–	–4	–	mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 5 V, I _D = 6 A	–	0.100	0.180	Ω
V _{DS(on)}	Drain-Source On-Voltage On-Resistance	V _{GS} = 5 V, I _D = 12 A	–	–	2.6	V
g _{FS}	Forward Transconductance	V _{DS} = 8 V, I _D = 6 A	5	8.7	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	–	345	570	pF
C _{oss}	Output Capacitance		–	110	160	pF
C _{rss}	Reverse Transfer Capacitance		–	30	40	pF

SWITCHING CHARACTERISTICS (Note 2)

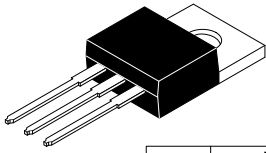
t _{D(on)}	Turn-On Delay Time	V _{DD} = 30 V, I _D = 12 A, V _{GS} = 5 V, R _{GEN} = 9.1 Ω	–	–	20	ns
t _r	Turn-On Rise Time		–	–	190	ns
t _{D(off)}	Turn-Off Delay Time		–	–	30	ns
t _f	Turn-Off Fall Time		–	–	90	ns
Q _g	Total Gate Charge	V _{DS} = 48 V, I _D = 12 A, V _{GS} = 5 V	–	7.8	10	nC
Q _{gs}	Gate-Source 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 V, I _S = 12 A (Note 2)	–	–	1.3	V
t _{rr}	Drain-Source Reverse Recovery Time	I _F = 12 A, di/dt = 100 A/μs	–	55	–	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

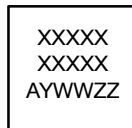
2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2.0%.


TO-220-3LD
CASE 340AT
ISSUE B

DATE 08 AUG 2022

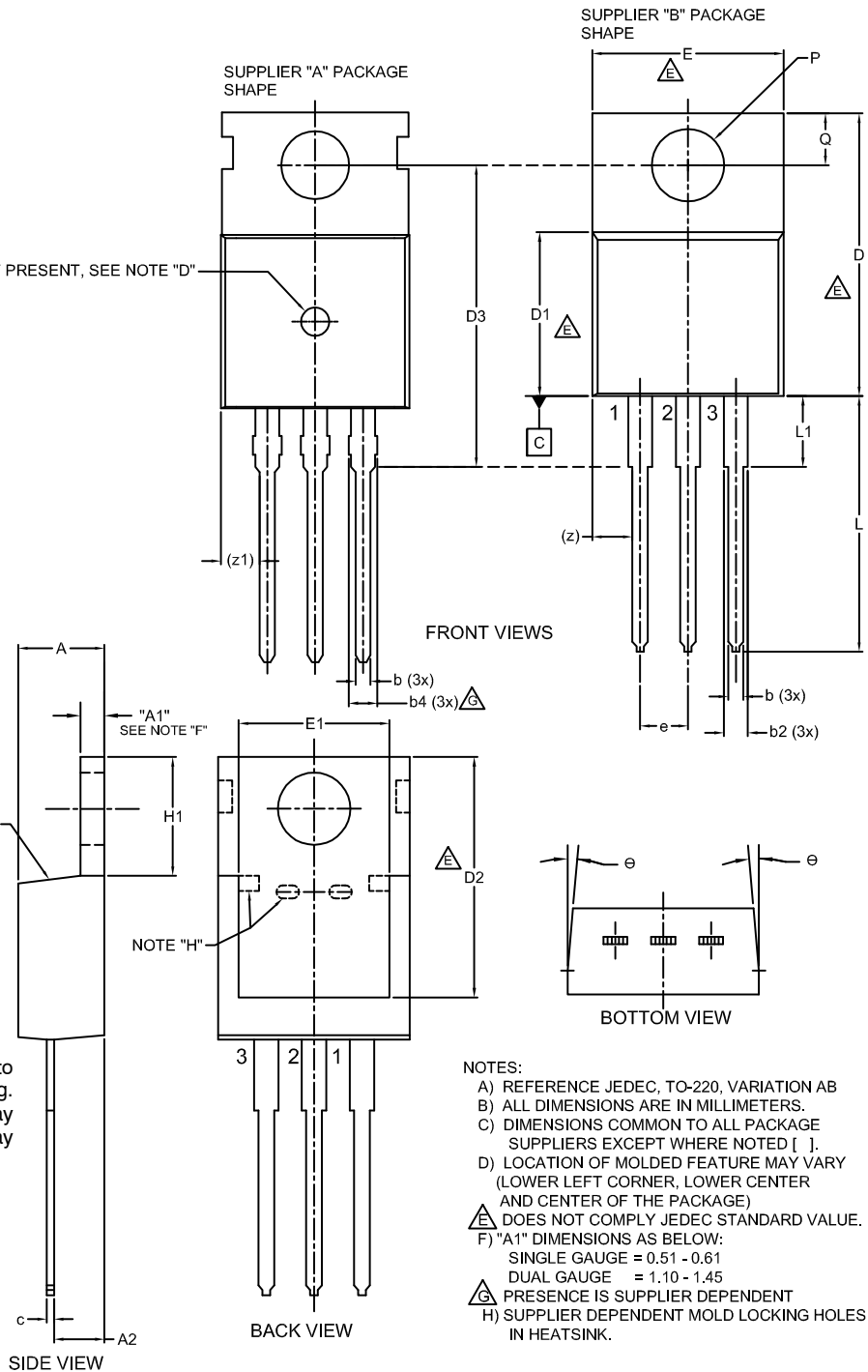
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.00	--	4.70
A1	SEE NOTE "F"		
A2	2.10	--	2.85
b	0.55	--	1.00
b2	1.10	--	1.62
b4	1.42	--	1.62
c	0.36	--	0.60
D	13.90	--	16.30
D1	8.13	--	9.40
D2	11.50	--	14.30
D3	15.42	--	16.51
E	9.65	--	10.67
E1	7.59	--	8.65
e	2.40	--	2.67
H1	6.06	--	6.69
L	12.70	--	14.04
L1	2.70	--	4.10
P	3.50	--	4.00
Q	2.50	--	3.40
z	2.13 REF		
z1	2.06 REF		
θ	3°	--	5°

IF PRESENT, SEE NOTE "D"

GENERIC
MARKING DIAGRAM*


XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



DOCUMENT NUMBER:	98AON13818G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-220-3LD	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales