FAIRCHILD SEMICONDUCTOR TM

June 2000
DISTRIBUTION GROUP*

MTP3055VL

N-Channel Logic Level Enhancement Mode Field Effect Transistor

General Description

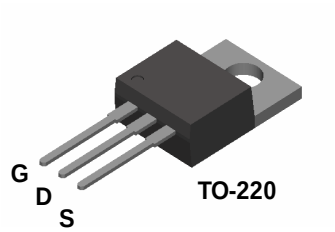
This N-Channel Logic Level MOSFET has been designed specifically for low voltage, high speed switching applications i.e. power supplies and power motor controls.

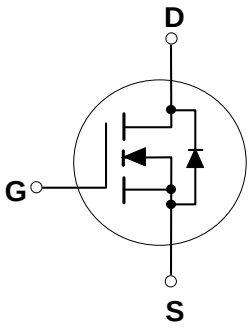
This MOSFET features faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications.

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 Ω @ V_{GS} = 5 V
- Critical DC electrical parameters specified at elevated temperature.
- Low drive requirements allowing operation directly from logic drivers. Vgs(th) < 2 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°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	±15	V
I_D	Drain Current - Continuous	12	A
	- Pulsed	42	
P_D	Power Dissipation @ T_C = 25°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

Thermal Characteristics

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

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°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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 = 100A/µs		55		nS

Notes:

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

2. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™
ActiveArray™
Bottomless™
CoolFET™
CROSSVOLT™
DOME™
EcoSPARK™
E^2CMOS™
EnSigna™
FACT™
FACT Quiet Series™
FAST®
FASTr™
FPS™
FRFET™
GlobalOptoisolator™
GTO™
HiSeC™
I^2C™
i-Lo™
ImpliedDisconnect™
ISOPLANAR™
LittleFET™
MICROCOUPLER™
MicroFET™
MicroPak™
MICROWIRE™
MSX™
MSXPro™
OCX™
OCXPro™
OPTOLOGIC®
OPTOPLANAR™
PACMAN™
POP™
Power247™
PowerSaver™
PowerTrench®
QFET®
QS™
QT Optoelectronics™
Quiet Series™
RapidConfigure™
RapidConnect™
µSerDes™
SILENT SWITCHER®
SMART START™
SPM™
Stealth™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SyncFET™
TinyLogic®
TINYOPTO™
TruTranslation™
UHC™
UltraFET®
VCX™

Across the board. Around the world.™
The Power Franchise®
Programmable Active Droop™

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. I11