FAIRCHILD SEMICONDUCTOR™

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DISTRIBUTION GROUP*

MTD3055VL

N-Channel Logic Level Enhancement Mode Field Effect Transistor

General Description

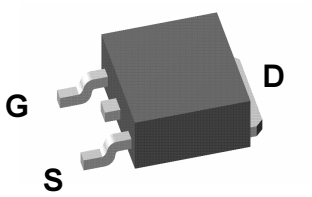
This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

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), and DC/DC power supply designs with higher overall efficiency.

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.



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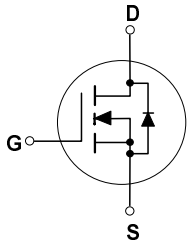

Absolute Maximum Ratings

T_C=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Maximum Drain Current -Continuous	(Note 1)	12	A
	T_C = 100°C	(Note 1)	8	
	Maximum Drain Current -Pulsed		42	
P_D	Maximum Power Dissipation @ T_C = 25°C	(Note 1)	48	W
	T_A = 25°C	(Note 1a)	3.9	
	T_A = 25°C	(Note 1b)	1.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to- Case	(Note 1)	3.13	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to- Ambient	(Note 1a)	71.4	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
MTD3055VL	MTD3055VL	13"	16mm	2500

* 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		54		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	1.5	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		-2.6		mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 5 V, I_D = 6 A,			0.18	Ω
$V_{DS(on)}$	Drain-Source On-Voltage On-Resistance	V_{GS} = 5 V, I_D = 12 A I_D = 6 A, T_J =150°C			2.6 2.5	V
g_{FS}	Forward Transconductance	V_{DS} = 8 V, I_D = 6 A	5.0			S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz			570	pF
C_{oss}	Output Capacitance				160	pF
C_{rss}	Reverse Transfer Capacitance				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			10	nC
Q_{gs}	Gate-Source Charge			2		nC
Q_{gd}	Gate-Drain Charge			6.1		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		51		nS

Notes:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the drain tab. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

a) $R_{\theta JA}$ = 38°C/W when mounted on a 1 in^2 pad of 2oz copper.

b) $R_{\theta JA}$ = 96°C/W when mounted on a minimuim pad.

Scale 1 : 1 on letter size paper

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

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