



March 2015

MTD3055VL

# MTD3055VL

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

### General Description

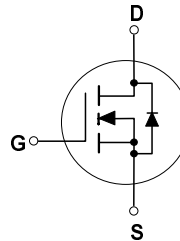
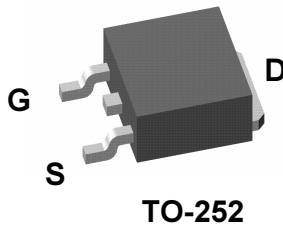
This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

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.  $R_{DS(ON)} = 0.18 \Omega @ V_{GS} = 5 V$
- Critical DC electrical parameters specified at elevated temperature.
- Low drive requirements allowing operation directly from logic drivers.  $V_{GS(th)} < 2 V$ .
- 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 $T_c=25^\circ C$ unless otherwise noted

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

### Thermal Characteristics

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

### 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

$T_C = 25^\circ\text{C}$  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 $25^\circ\text{C}$		54		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	$\mu\text{A}$
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$			100	
$I_{GSSF}$	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	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.5	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-2.6		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 5\text{ V}, I_D = 6\text{ A}$			0.18	$\Omega$
$V_{DS(on)}$	Drain-Source On-Voltage On-Resistance	$V_{GS} = 5\text{ V}, I_D = 12\text{ A}$			2.6	V
		$I_D = 6\text{ A}, T_J = 150^\circ\text{C}$			2.5	
$g_{FS}$	Forward Transconductance	$V_{DS} = 8\text{ V}, I_D = 6\text{ A}$	5.0			S

### Dynamic Characteristics

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

### Switching Characteristics (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 12\text{ A}, V_{GS} = 5\text{ V}, R_{GEN} = 9.1\ \Omega$			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	$V_{DS} = 48\text{ V}, I_D = 12\text{ A}, V_{GS} = 5\text{ V}$			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	$V_{GS} = 0\text{ V}, I_S = 12\text{ A}$ (Note 2)			1.3	V
$t_{rr}$	Drain-Source Reverse Recovery Time	$I_F = 12\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		51		nS

**Notes:**

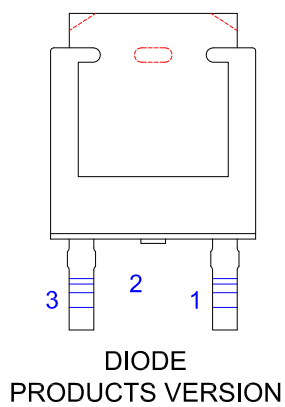
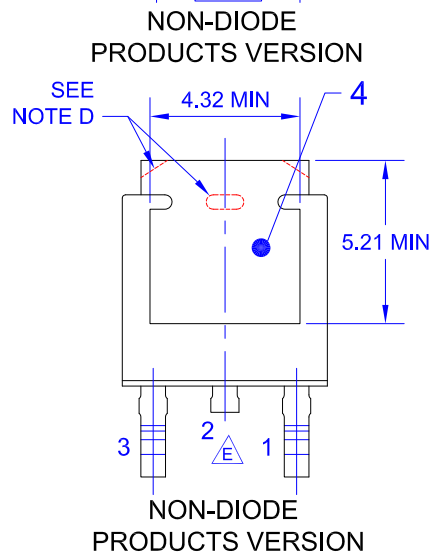
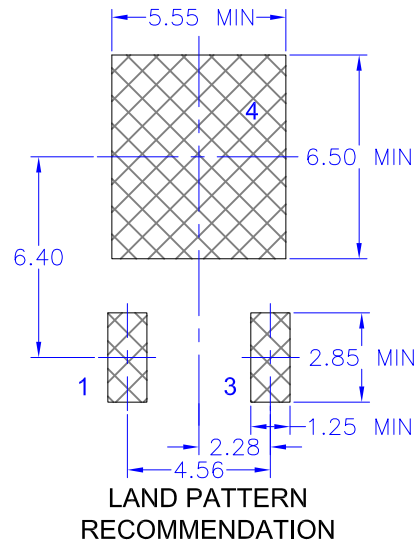
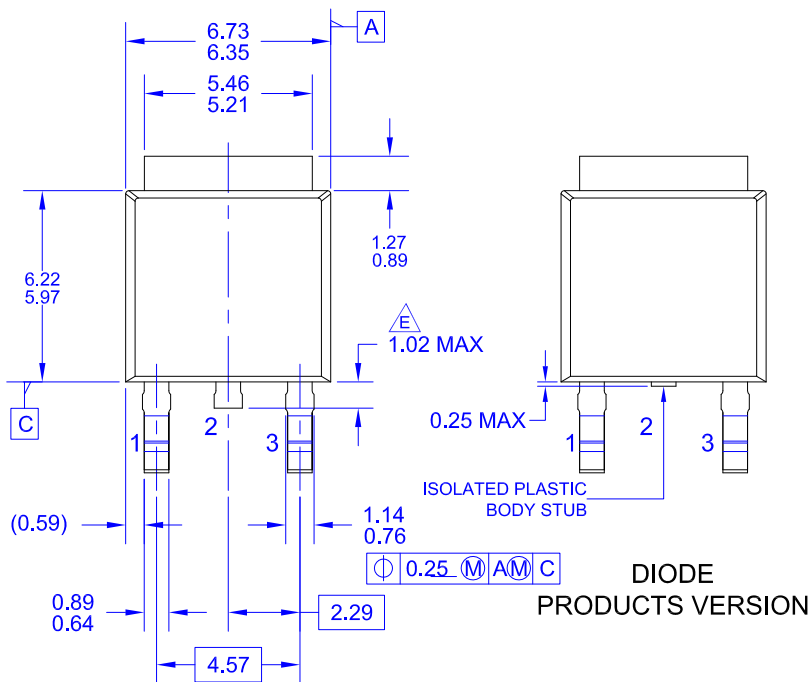
- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the drain tab.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



■ a)  $R_{\theta JA} = 38^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2oz copper.

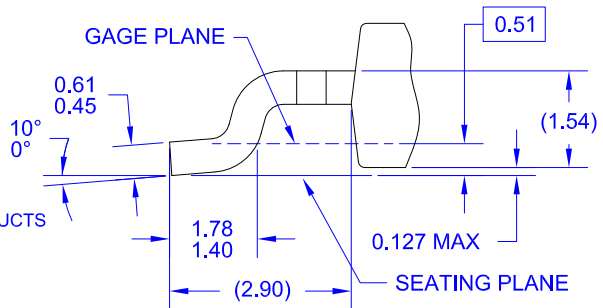
■ b)  $R_{\theta JA} = 96^\circ\text{C/W}$  when mounted on a minimum pad.

Scale 1 : 1 on letter size paper  
 2. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
- D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
- E) TRIMMED METAL CENTER LEAD IS PRESENT ON FOR NON-DIODE PRODUCTS
- F) DIMENSIONS ARE EXCLUSIVE OF BURS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.
- H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV11





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| EfficientMax™            | MicroPak™                                      | SPM®                                  | Ultra FRFET™     |
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| FPS™                     | OptoHiT™                                       |                                       |                  |
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