FAIRCHILD SEMICONDUCTOR™

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MTP3055V

N-Channel Enhancement Mode Field Effect Transistor

General Description

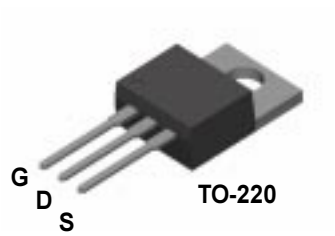
This N-Channel MOSFET has been designed specifically for low voltage, high speed switching applications i.e. power supplies and power motor controls.

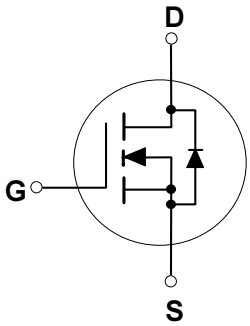
These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications.

The result is a MOSFET that is easy and safer to drive (even at very high frequencies).

Features

- 12 A, 60 V. $R_{DS(ON)}$ = 0.150 Ω @ V_{GS} = 10 V
- Critical DC electrical parameters specified at elevated temperature.
- 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	±20	V
I_D	Drain Current - Continuous	12	A
	- Pulsed	37	
P_D	Total 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
MTP3055V	MTP3055V	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		63		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V			10	μA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V, T_J = 150°C			100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 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	2	3	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		-5		mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 6 A,			0.150	Ω
$V_{DS(on)}$	Drain Source On-Voltage	I_D = 12 A, V_{GS} = 10 V			2.2	V
g_{FS}	Forward Transconductance	V_{DS} = 7 V, I_D = 6 A	4.0			S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz			500	pF
C_{oss}	Output Capacitance				180	pF
C_{rss}	Reverse Transfer Capacitance				50	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 12 A, V_{GS} = 10 V, R_{GEN} = 9.1 Ω			16	ns
t_r	Turn-On Rise Time				38	ns
$t_{d(off)}$	Turn-Off Delay Time				80	ns
t_f	Turn-Off Fall Time				45	ns
Q_g	Total Gate Charge	V_{DS} = 48 V, I_D = 12 A, V_{GS} = 10 V			17	nC
Q_{gs}	Gate-Source Charge			2.3		nC
Q_{gd}	Gate-Drain Charge			2.6		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)				37	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 12 A (Note 2)			1.6	V

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%

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