

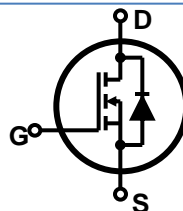
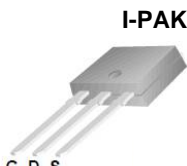
## Features

- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification
- Fast reverse recovery

$$V_{DSS} = 550 \text{ V @ } T_{jmax}$$

$$I_D = 4.5 \text{ A}$$

$$R_{DS(ON)} = 1.65 \Omega(\text{max}) @ V_{GS} = 10 \text{ V}$$



Device	Package	Marking	Remark
TMD5N50/TMU5N50	D-PAK/I-PAK	TMD5N50/TMU5N50	RoHS
TMD5N50G/TMU5N50G	D-PAK/I-PAK	TMD5N50G/TMU5N50G	Halogen Free

## Absolute Maximum Ratings

Parameter	Symbol	TMD5N50(G)/TMU5N50(G)	Unit
Drain-Source Voltage	$V_{DSS}$	500	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C = 25 \text{ }^\circ\text{C}$	4.5
		$T_C = 100 \text{ }^\circ\text{C}$	2.86
Pulsed Drain Current (Note 1)	$I_{DM}$	18	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	240	mJ
Repetitive Avalanche Current (Note 1)	$I_{AR}$	4.5	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	9.25	mJ
Power Dissipation	$P_D$	$T_C = 25 \text{ }^\circ\text{C}$	92.5
		Derate above $25 \text{ }^\circ\text{C}$	0.74
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	300	$^\circ\text{C}$

\* Limited only by maximum junction temperature

## Thermal Characteristics

Parameter	Symbol	TMD5N50(G)/TMU5N50(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	1.35	$^\circ\text{C}/\text{W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$

**Electrical Characteristics :  $T_C=25^\circ\text{C}$ , unless otherwise noted**

Parameter	Symbol	Test condition	Min	Typ	Max	Units
<b>OFF</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	$\mu\text{A}$
Forward Gate-Source Leakage Current	$I_{GSSF}$	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
Reverse Gate-Source Leakage Current	$I_{GSSR}$	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

**ON**

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 2.25\text{ A}$	--	1.4	1.65	$\Omega$
Forward Transconductance <sup>(Note 4)</sup>	$g_{FS}$	$V_{DS} = 30\text{ V}, I_D = 2.25\text{ A}$	--	6	--	S

**DYNAMIC**

Input Capacitance	$C_{ISS}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	627	--	pF
Output Capacitance	$C_{OSS}$		--	61	--	pF
Reverse Transfer Capacitance	$C_{RSS}$		--	4.4	--	pF

**SWITCHING**

Turn-On Delay Time <sup>(Note 4,5)</sup>	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 4.5\text{ A},$ $R_G = 25\ \Omega$	--	42	--	ns
Turn-On Rise Time <sup>(Note 4,5)</sup>	$t_r$		--	32	--	ns
Turn-Off Delay Time <sup>(Note 4,5)</sup>	$t_{d(off)}$		--	68	--	ns
Turn-Off Fall Time <sup>(Note 4,5)</sup>	$t_f$		--	30	--	ns
Total Gate Charge <sup>(Note 4,5)</sup>	$Q_g$	$V_{DS} = 400\text{ V}, I_D = 4.5\text{ A},$ $V_{GS} = 10\text{ V}$	--	11	--	nC
Gate-Source Charge <sup>(Note 4,5)</sup>	$Q_{gs}$		--	3.2	--	nC
Gate-Drain Charge <sup>(Note 4,5)</sup>	$Q_{gd}$		--	2.7	--	nC

**SOURCE DRAIN DIODE**

Maximum Continuous Drain-Source Diode Forward Current	$I_S$	----	--	--	4.5	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$	----	--	--	18	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 4.5\text{ A}$	--	--	1.5	V
Reverse Recovery Time <sup>(Note 4)</sup>	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 4.5\text{ A}$ $dI_f / dt = 100\text{ A}/\mu\text{s}$	--	255	--	ns
Reverse Recovery Charge <sup>(Note 4)</sup>	$Q_{rr}$		--	1.43	--	$\mu\text{C}$

Note :

1. Repeated rating : Pulse width limited by safe operating area
2.  $L=21\text{mH}, I_{AS} = 4.5\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega,$  Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 4.5\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DS},$  Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width  $\leq 300\mu\text{s},$  Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

