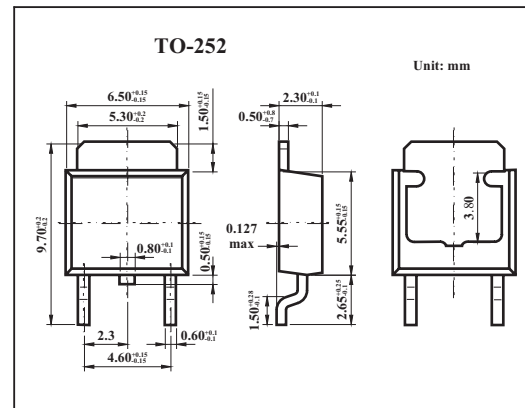
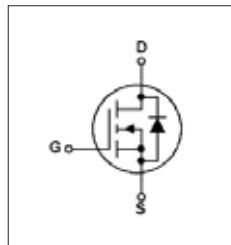


## 30V N-Channel PowerTrench<sup>®</sup> MOSFET FDD6690A

### ■ Features

- 46 A, 30 V  $R_{DS(ON)} = 12 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$   
 $R_{DS(ON)} = 14 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$
- Low gate charge
- Fast Switching Speed
- High performance trench technology for extremely low  $R_{DS(ON)}$



### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	@ $T_c=25^\circ\text{C}$	46
		@ $T_a=25^\circ\text{C}$ (Note 1a)	12
		Pulsed (Note 1a)	100
Power Dissipation	$P_D$	@ $T_c=25^\circ\text{C}$	56
		@ $T_a=25^\circ\text{C}$ (Note 1a)	3.3
		@ $T_a=25^\circ\text{C}$ (Note 1b)	1.5
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$
Thermal Resistance, Junction-to-Case (Note 1)	$R_{\theta JC}$	2.7	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Note 1a)	$R_{\theta JA}$	45	
(Note 1b)	$R_{\theta JA}$	96	

## FDD6690A

## ■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Testconditions	Min	Typ	Max	Unit
Drain-Source Avalanche Energy	EAS	Single Pulse, V <sub>DD</sub> = 15 V, I <sub>D</sub> = 12 A			180	mJ
Drain-Source Avalanche Current	I <sub>AS</sub>				12	A
Drain-Source Breakdown Voltage	B <sub>V</sub> DSS	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta B_{VDSS}}{\Delta T_J}$	I <sub>D</sub> = 250 mA		24		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1	mA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	1.9	3	V
Gate Threshold Voltage Temperature Coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	I <sub>D</sub> = 250 mA,		-5		mV/°C
Static Drain-Source On-Resistance	R <sub>Ds(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A		7.7	12	mW
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		9.9	14	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A, T <sub>J</sub> = 125°C		11.4	19	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 5 V	50			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 12 A		47		S
Input Capacitance	C <sub>iss</sub>			1230		pF
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		325		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			150		pF
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> = 15 mV, f = 1.0 MHz		1.5		pF
Turn-On Delay Time	t <sub>d(on)</sub>			10	19	ns
Turn-On Rise Time	t <sub>r</sub>	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6Ω		7	13	ns
Turn-Off Delay Time	t <sub>d(off)</sub>			29	46	ns
Turn-Off Fall Time	t <sub>f</sub>			12	21	ns
Total Gate Charge	Q <sub>g</sub>			13	18	nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 12 A, V <sub>GS</sub> = 5 V		3.5		nC
Gate-Drain Charge	Q <sub>gd</sub>			5.1		nC
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				2.3	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 2.3 A (Note 2)		0.76	1.2	V
Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 12 A, di <sub>F</sub> /dt = 100 A/μs		24		nS
Diode Reverse Recovery Charge	Q <sub>rr</sub>			13		nC

## Notes:

1. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



a) R<sub>θJA</sub> = 45°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b) R<sub>θJA</sub> = 96°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

3. Maximum current is calculated as:  $\sqrt{\frac{P_D}{R_{DS(on)}}$

where P<sub>D</sub> is maximum power dissipation at T<sub>C</sub> = 25°C and R<sub>DS(on)</sub> is at T<sub>J(max)</sub> and V<sub>GS</sub> = 10V. Package current limitation is 21A