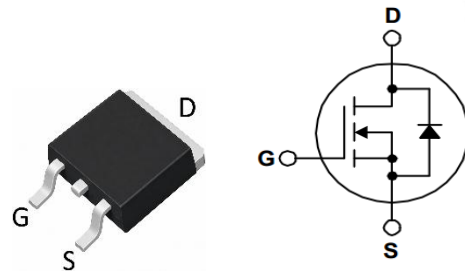


TH4N65PG

650V 4A 2.2Ω Silicon N-Channel Planar Power MOSFET

Features of this MOSFET are 150°C operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for a wide variety of applications.



Package view and circuit symbol

General Features

- $V_{DS}=650V, I_D=4A$
- Low ON Resistance, $R_{DS(on), typ.}=2.2\Omega @ V_{GS}=10V, I_D=2A$
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Applications

- Power switching application
- Digital amplifier
- Adapter and charger

Key Performance Parameters

Parameter	Value	Unit
$V_{DSS}, \min @ T_J = 25^\circ C$	650	V
$T_J, \text{maximum junction temperature}$	150	°C
$I_D @ T_C = 25^\circ C (\text{Silicon Limit})$	4	A
$I_{D,pulse} @ T_C = 25^\circ C, t_p \text{ limited by } T_{Jmax.}$	16	A
$R_{DS(on), typ.} @ T_J = 25^\circ C, V_{GS} = 10V$	2.2	Ω
$E_{AS}, typ. @ T_J = 25^\circ C$	235	mJ



Marking Information

Product Name	Package	Marking
TH4N65PG	TO-252	TH4N65PG

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Maximum Ratings (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain to Source Voltage		V _{DSS}	650	V
Gate to Source Voltage		V _{GSS}	±30	V
Drain Current _(Silicon limit)	T _C =25°C	I _D	4	A
Pulsed Drain Current	T _C =25°C tp limited by T _{vjmax}	I _{DM}	16	A
Avalanche energy, single pulse	L=10mH, R _g =25Ω	E _{AS}	235	mJ
Power Dissipation	T _C =25°C	P _D	89	W
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 To +150	°C
Lead Temperature for Soldering Purposes		T _L	270	

Thermal Characteristics

Parameter	Symbol	Max Value	Unit
Thermal Resistance, Junction-to-Case	R _{thJC}	1.4	°C/W
Thermal Resistance, Junction-to-Ambient	R _{thJA}	62	

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-to-Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V$ $V_{DS}=V_{DSS}$ $T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{GS}=0V$ $V_{DS}=80\%V_{DSS}$ $T_J=125^\circ\text{C}$	-	-	10	
Gate-to-Source leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu A$ $T_J=25^\circ\text{C}$	2.0	-	4.0	V
Drain-Source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V$, $I_D=2A$ $T_J=25^\circ\text{C}$	-	2.2	2.65	Ω
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$	-	17	-	Ω
Transconductance	g_{fs}	$V_{DS}=40V, I_D=2A$	-	5	-	S
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	-	565	-	pF
Output Capacitance	C_{oss}		-	50	-	
Reverse Transfer Capacitance	C_{rss}		-	45	-	
Total Gate Charge	Q_g	$V_{DS} = 325\text{ V}, V_{GS} = 0/10\text{ V},$ $I_D = 4\text{ A}$	-	10	-	nC
Gate- Source charge	Q_{gs}		-	3	-	
Gate-Drain charge	Q_{gd}		-	2.8	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 325\text{ V}$	-	10	-	ns
Turn-Off Delay Time	$t_{d(off)}$	$V_{GS} = 10\text{ V}$	-	30	-	
Rise time	t_r	$I_D = 4\text{ A}$ $R_G = 25\Omega$	-	28	-	
Fall time	t_f	$T_J = 25^\circ\text{C}$	-	29	-	

Diode Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Continuous Forward Current	I_S	$T_C=25^\circ\text{C}$	-	-	4	A
Pulsed Diode Forward Current	I_{SM}		-	-	16	
Diode Forward Voltage	V_{SD}	$I_S = 4A$ $T_J = 25^\circ\text{C}$	-	-	1.5	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 4\text{ A},$	-	240	-	ns
Reverse Recovery Charge	Q_{rr}	$dI_S/dt = 100\text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$	-	760	-	nC

Typical Performance Characteristics

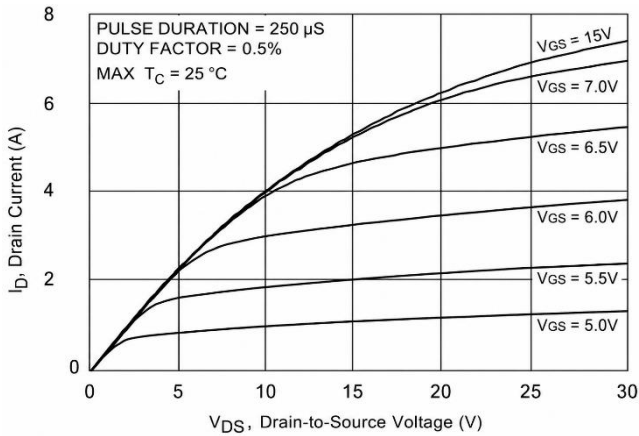


Fig 1. Typical output characteristic

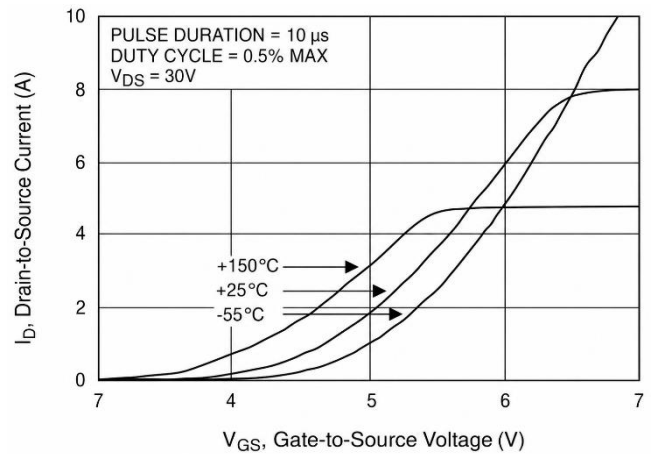


Fig 2. Typical transfer characteristic

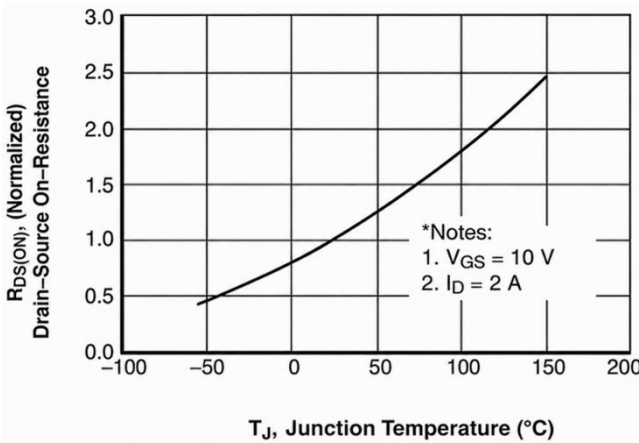


Fig 3. On-Resistance vs. Junction Temperature

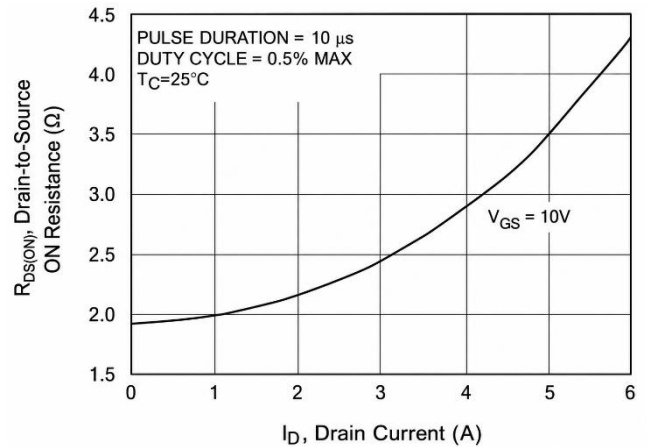


Fig 4. $R_{DS(on)}$ vs Drain Current and Gate Voltage

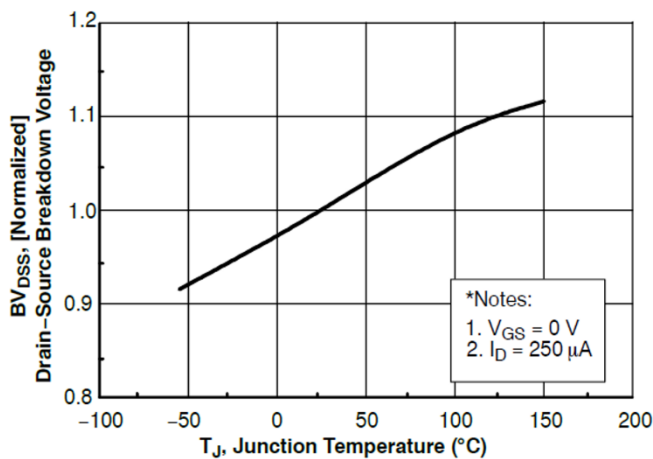


Fig 5. Breakdown Voltage Variation vs Temperature

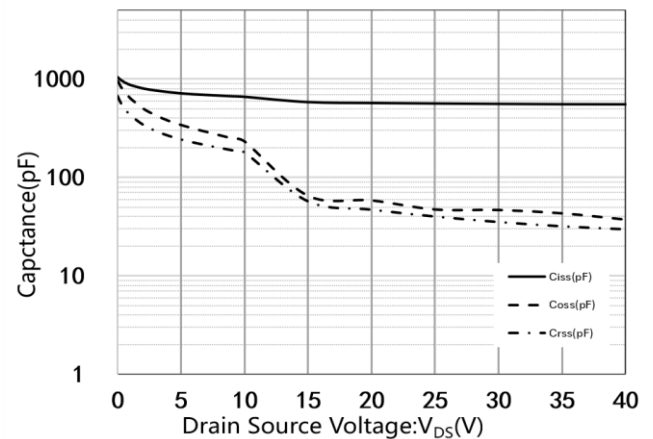


Fig 6. Capacitance Characteristics

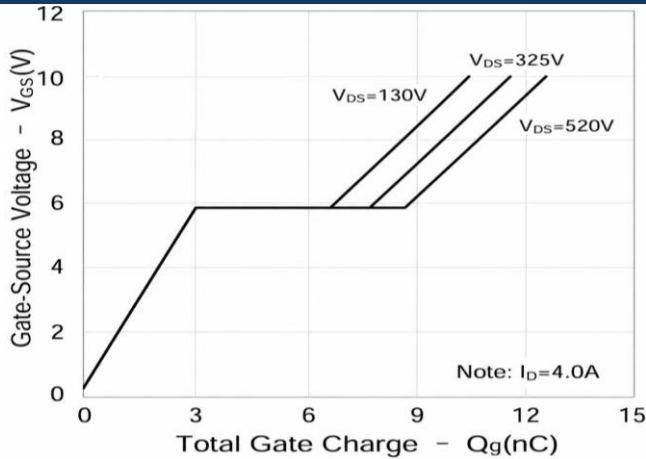


Fig 7. Gate Charge Characteristics

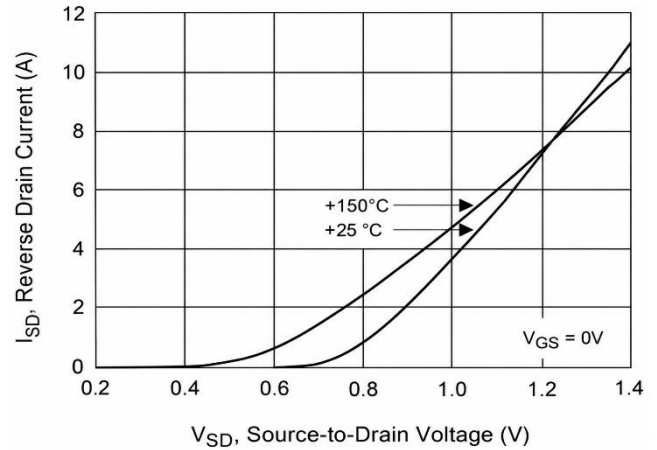


Fig 8. Body-diode Forward Characteristics

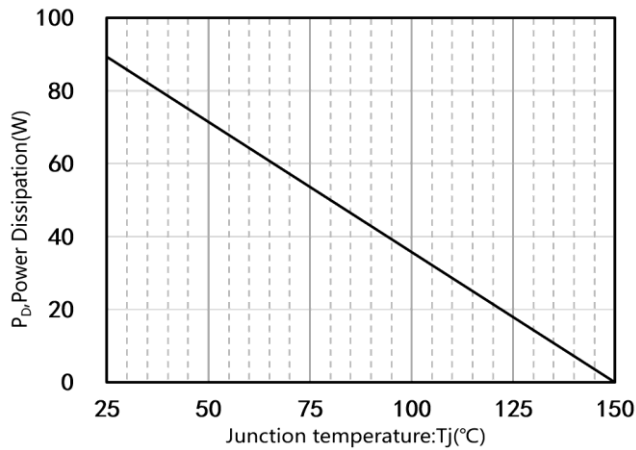


Fig 9. Power Dissipation

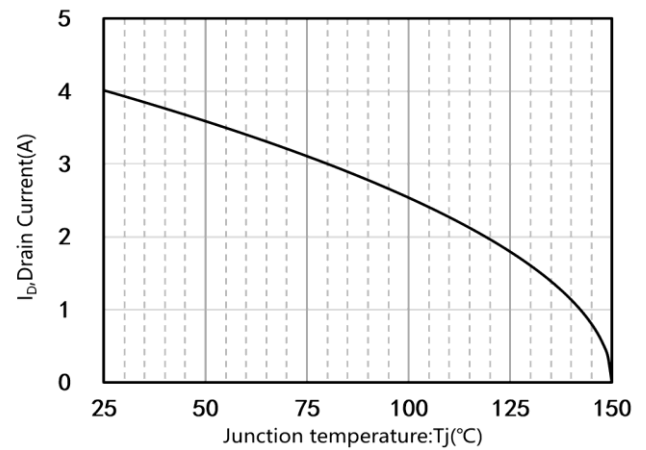


Fig 10. Drain Current Derating

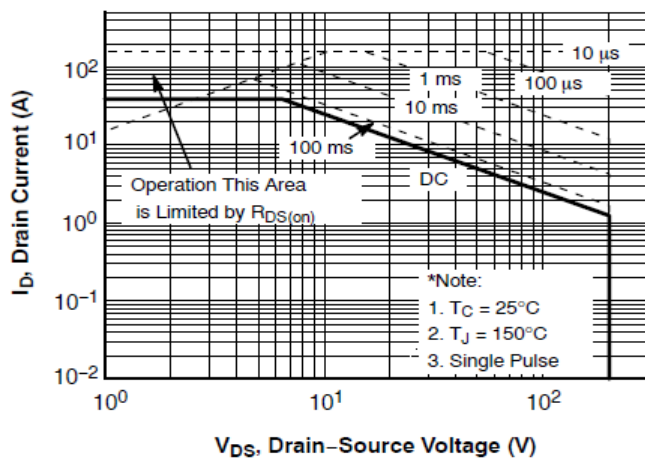


Fig 11. Safe Operating Area

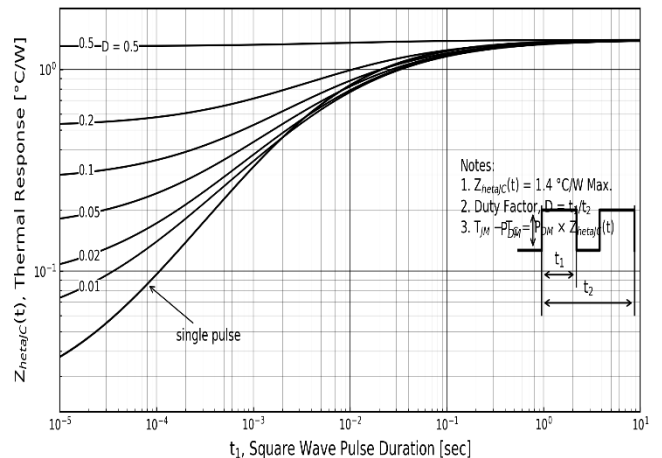
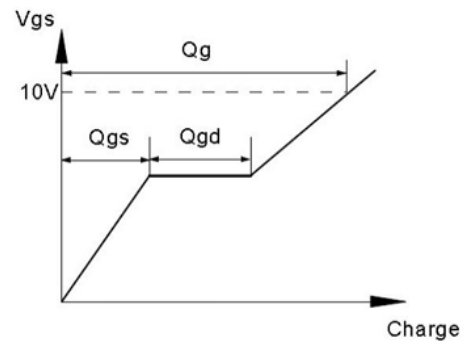
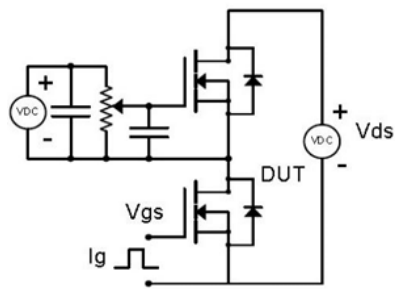
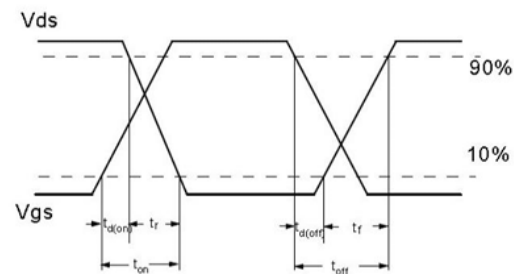
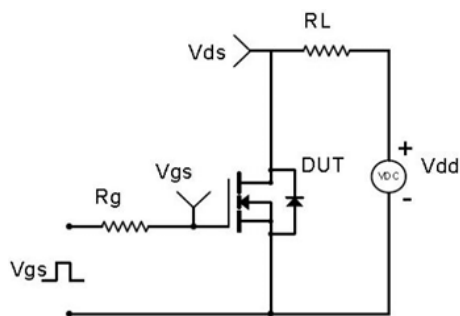


Fig 12. Transient Thermal Response Curve

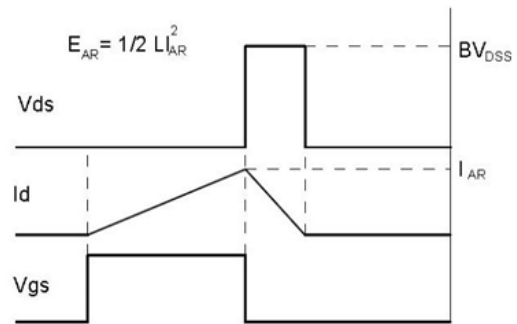
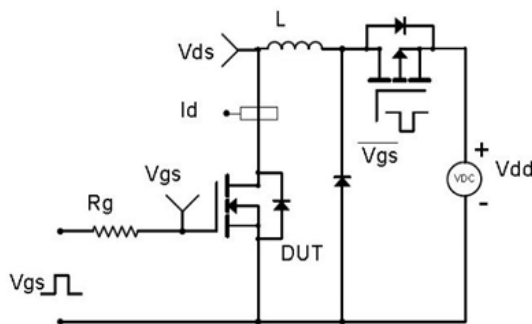
Test Circuit & Waveform



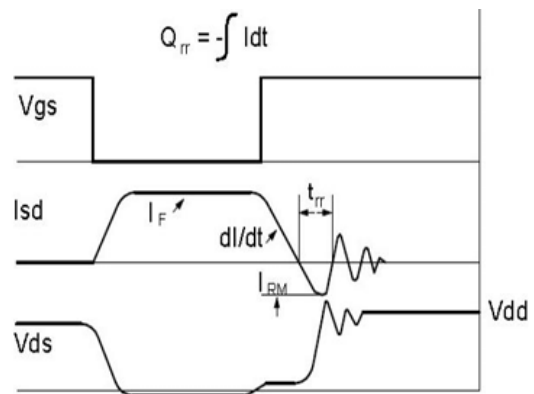
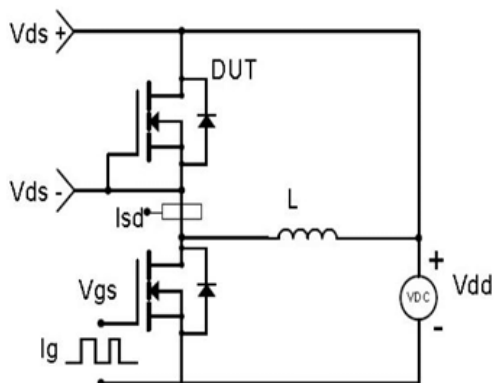
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

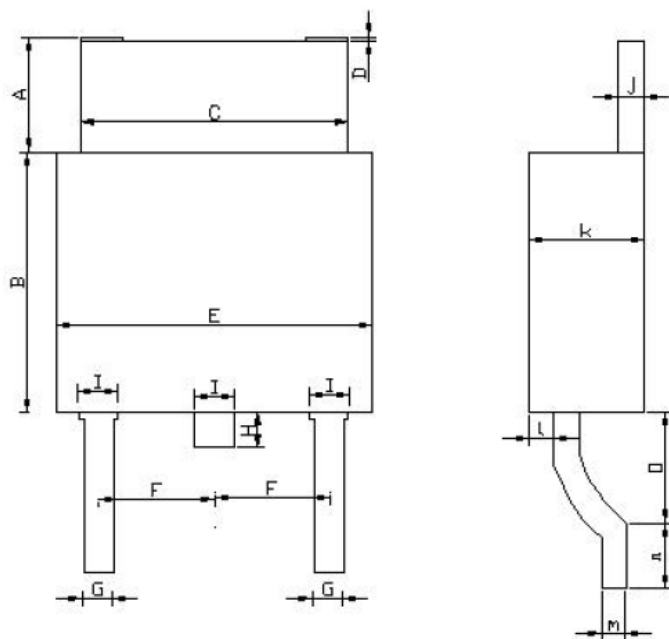


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

Package Information



Symbol	Dimensions (millimeters)	
	Min.	Max.
A	0.40	1.40
B	5.35	6.35
C	4.80	5.80
D	0.08	0.12
E	5.80	6.80
F	2.20	2.40
G	0.50	0.70
H	0.20	1.2
I	0.70	0.9
J	0.41	0.61
K	2.05	2.55
L	0.55	1.05
M	0.41	0.61
N	1.05	1.55
O	1.25	1.75

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