



CTH3903NS-T52

N-Channel Enhancement MOSFET

Features

- Drain-Source Breakdown Voltage V_{DSS} 30V
- Drain-Source On-Resistance
 $R_{DS(ON)}$ 11m Ω , at $V_{GS}= 10V$, $I_D= 15A$
 $R_{DS(ON)}$ 16m Ω , at $V_{GS}= 4.5V$, $I_D= 15A$
- *Continuous Drain Current* at $T_C=25^\circ C$ $I_D =39A$
- Advanced high cell density Trench Technology
- RoHS Compliance & Halogen Free

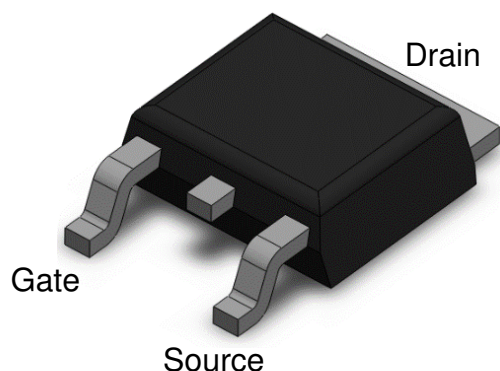
Description

The CTH3903NS-T52 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application.

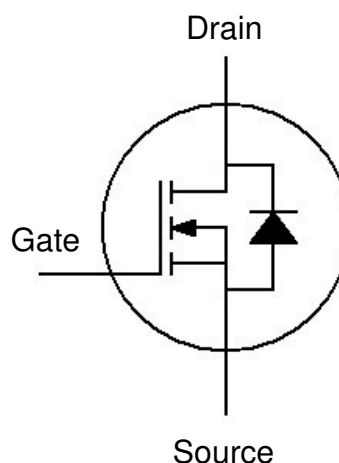
Applications

- DC/DC Converter
- Power Management
- Battery Powered System

Package Outline



Schematic





Absolute Maximum Rating at 25°C

Symbol	Parameters	Test Conditions	Min	Note
V _{DS}	Drain-Source Voltage	30	V	
V _{GS}	Gate-Source Voltage	±20	V	
I _D	Continuous Drain Current @T _C =25°C	39	A	1
I _{DM}	Pulsed Drain Current	100	A	1
P _D	Total Power Dissipation @T _C =25°C	37	W	2
T _{STG}	Storage Temperature Range	-55 to 150	°C	
T _J	Operating Junction Temperature Range	-55 to 150	°C	

Thermal Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
R _{θJC}	Thermal Resistance Junction-Case		--	--	3.3	°C /W	1,4



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

Static Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$B_{V_{DS}}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V	
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	μA	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA	

On Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$R_{DS(ON)}$	Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 15A$	-	11	15	m Ω	3
		$V_{GS} = 4.5V, I_D = 15A$		16	20	m Ω	
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.0	2	3.0	V	3

Dynamic Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
C_{ISS}	Input Capacitance	$V_{GS} = 0V,$ $V_{DS} = 15V$ $f = 1MHz$	-	700	800	pF	
C_{OSS}	Output Capacitance		-	120	-		
C_{RSS}	Reverse Transfer Capacitance		-	35	-		

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$T_{D(ON)}$	Turn-On Delay Time	$V_{DS} = 15V,$ $V_{GS} = 10V,$ $R_G = 3\Omega, R_L = 1.5\Omega,$ $I_D = 10A$	-	14	17	ns	
T_R	Rise Time		-	12	15		
$T_{D(OFF)}$	Turn-Off Delay Time		-	43	55		
T_F	Fall Time		-	4	6		
Q_G	Total Gate Charge	$V_{DS} = 15V,$ $V_{GS} = 10V,$ $I_D = 10A$	-	20	26	nC	
Q_{GS}	Gate-Source Charge		-	5	-		
Q_{GD}	Gate-Drain (Miller) Charge		-	4.9	-		



Drain-Source Diode Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V _{SD}	Body Diode Forward Voltage	V _{GS} = 0V, I _{SD} = 1A	-	0.75	1.1	V	1
I _{SD}	Body Diode Continuous Current		-	-	1.0	A	1

Note:

1. The power dissipation is limited by 150°C junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
3. Thermal Resistance follow JESD51-3.



Typical Characteristic Curves

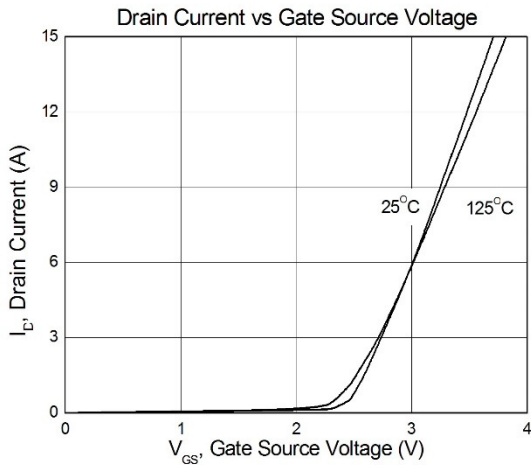


Figure 1

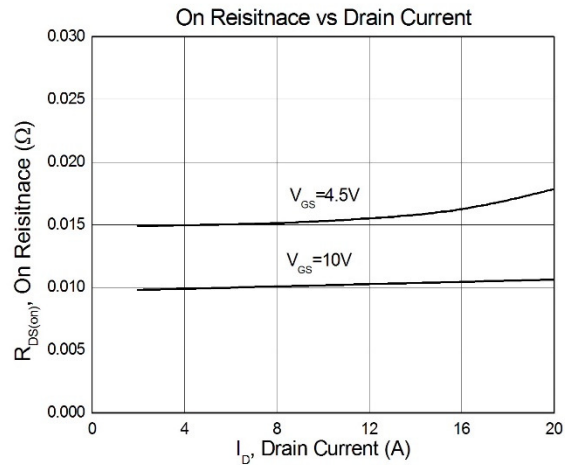


Figure 2

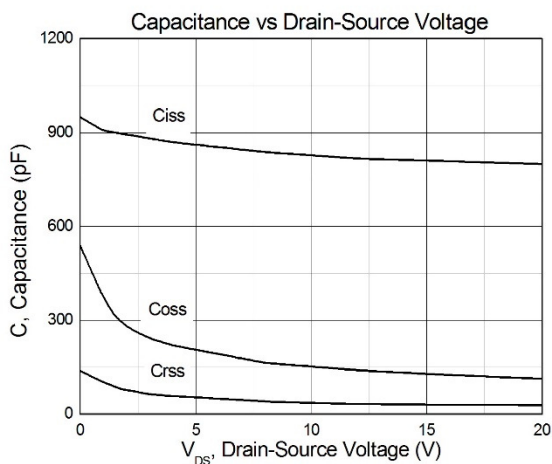


Figure 3

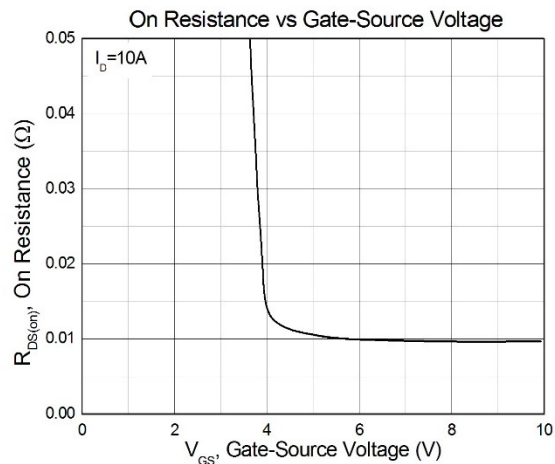


Figure 4

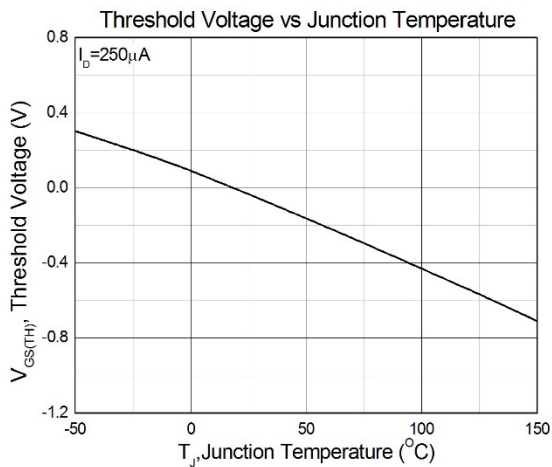


Figure 5

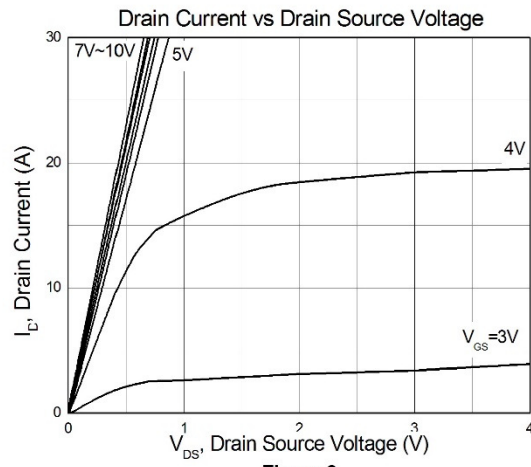


Figure 6

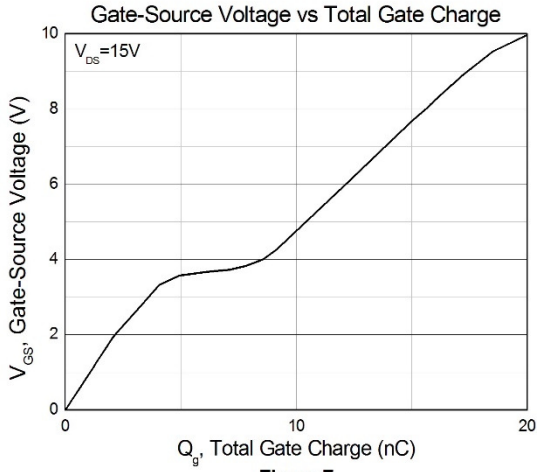


Figure 7

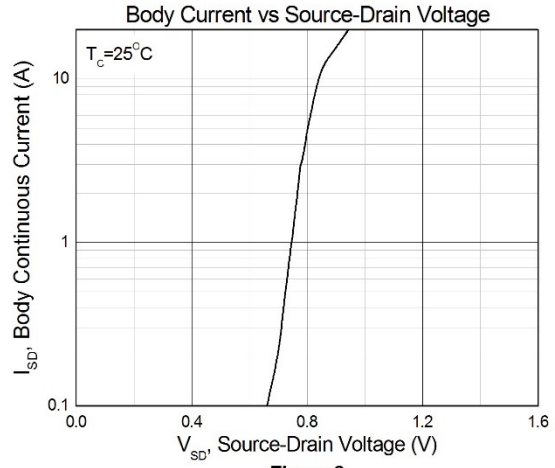


Figure 8



Test Circuits & Waveforms

Figure 9: Gate Charge Test Circuit

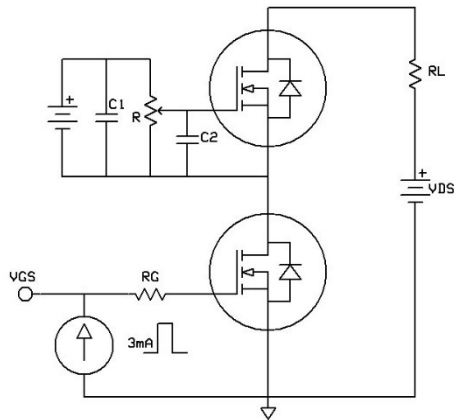


Figure 10: Gate Charge Waveform

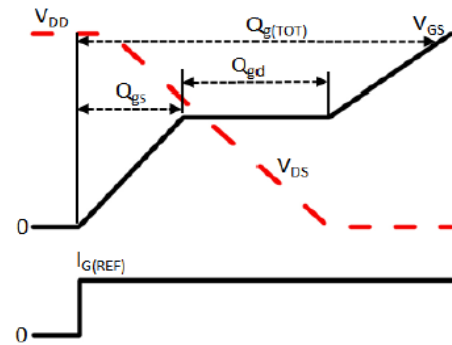


Figure 11: Switching Time Test Circuit

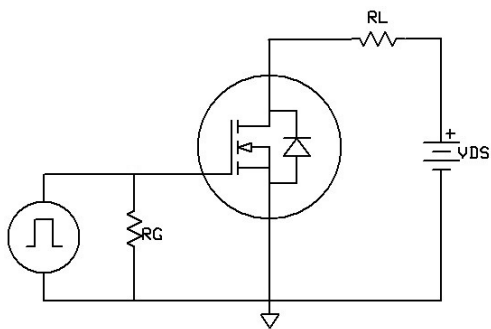
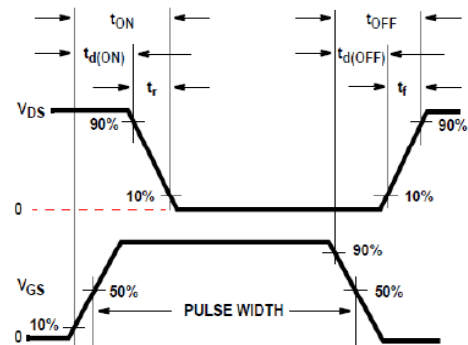
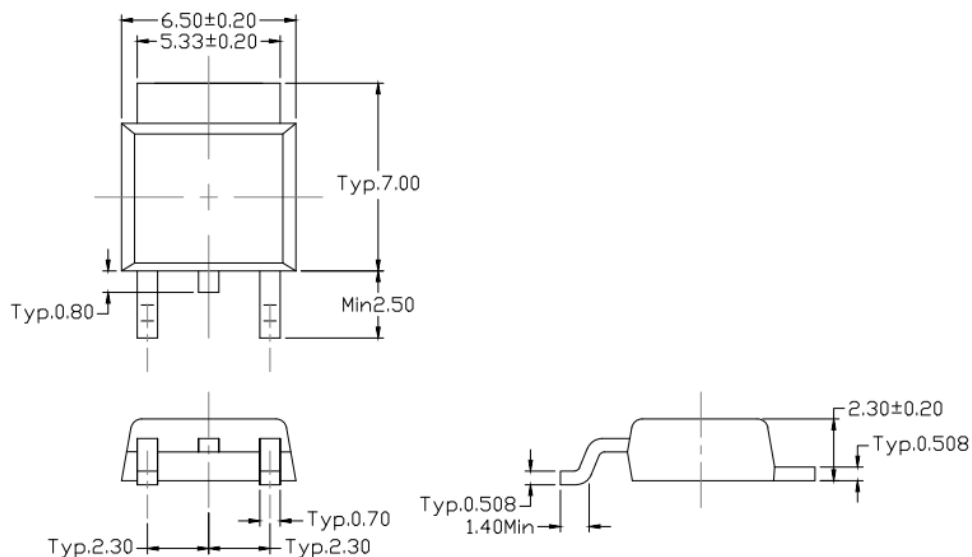


Figure 12: Switching Time Waveform



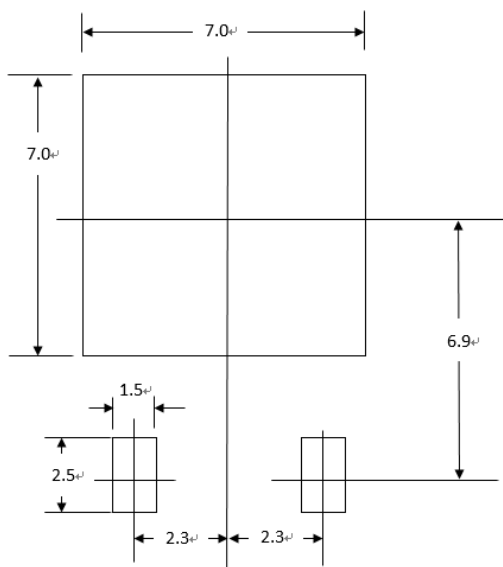


Package Dimension (TO-252)



Dimensions in mm unless otherwise stated

Recommended pad layout for surface mount leadform



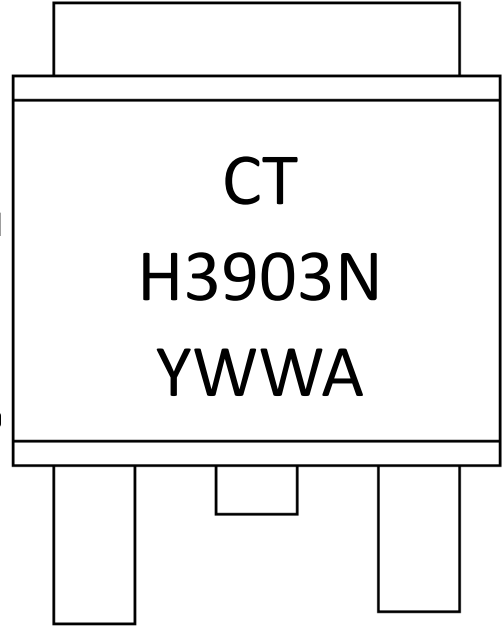
Dimensions in mm unless otherwise stated

CTH3903NS
YWWA

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Channel Enhancement MOSFET

CT : Denotes "CT M
H3903N : Device Number
Y : Fiscal Year
WW : Work Week
A : Production Code

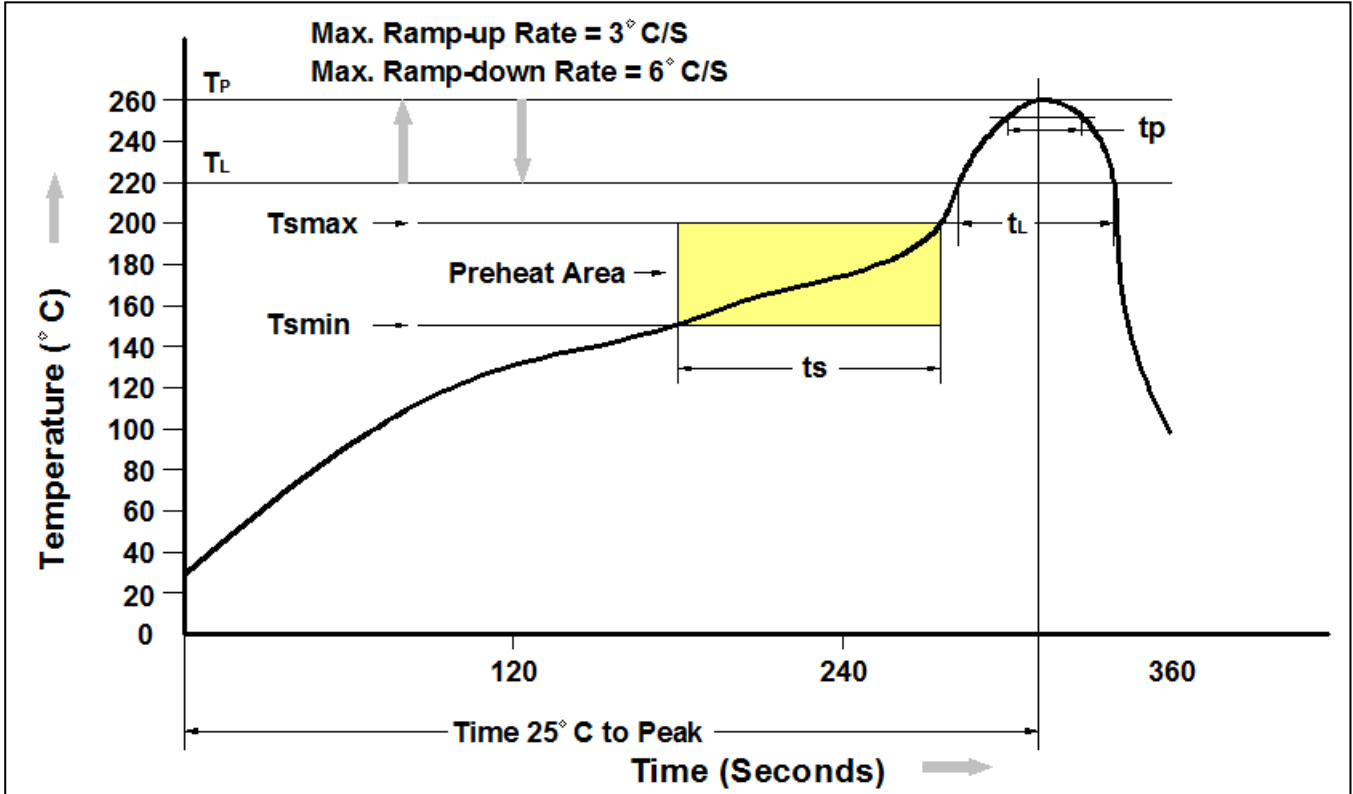


Ordering Information

Part Number	Description	Quantity
CTH3903NS-T52	TO-252 Reel	2500 pcs



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{min})	150 °C
Temperature Max. (T _{max})	200 °C
Time (t _s) from (T _{min} to T _{max})	60-120 seconds
Ramp-up Rate (t _L to t _P)	3 °C/second max.
Liquidous Temperature (T _L)	217 °C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (t _P) within 5 °C of 260 °C	30 seconds
Ramp-down Rate (T _P to T _L)	6 °C/second max
Time 25 °C to Peak Temperature	8 minutes max.



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