

N-Channel Enhancement Mode Power MOSFET

Description

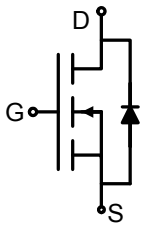
The HN10N03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.5V. This device is suitable for use as a Battery protection or in other Switching application.

Application

- PWM applications
- Load switch
- Power management

General Features

- $V_{DS} = 30V, I_D = 10A$
 $R_{DS(ON)} = 30m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} = 25m\Omega @ V_{GS}=4.5V$
 $R_{DS(ON)} = 22m\Omega @ V_{GS}=10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package



TO-252

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	10	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	30	A
Maximum Power Dissipation	P_D	10	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	89	$^\circ C/W$
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Electrical Characteristics ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA

Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.7	0.9	1.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=4A$	-	30	40	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	25	30	m Ω
		$V_{GS}=10V, I_D=5.8A$	-	19	22	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=5A$	10	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	825	-	PF
Output Capacitance	C_{OSS}		-	100	-	PF
Reverse Transfer Capacitance	C_{RSS}		-	78	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, R_L=2.7\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	3.3	-	nS
Turn-on Rise Time	t_r		-	4.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	nS
Turn-Off Fall Time	t_f		-	4	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=5.8A,$ $V_{GS}=4.5V$	-	10	-	nC
Gate-Source Charge	Q_{gs}		-	1.6	-	nC
Gate-Drain Charge	Q_{gd}		-	3.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=5.8A$	-	-	1.2	V
Diode Forward Current ^(Note 2)	I_S		-	-	10	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

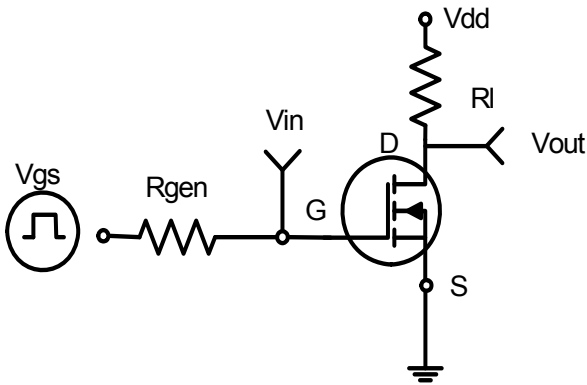


Figure 1: Switching Test Circuit

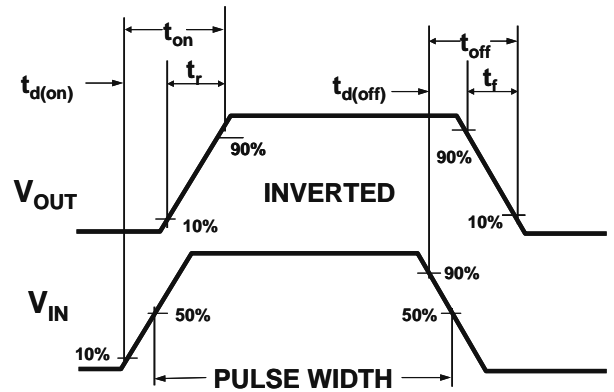


Figure 2: Switching Waveforms

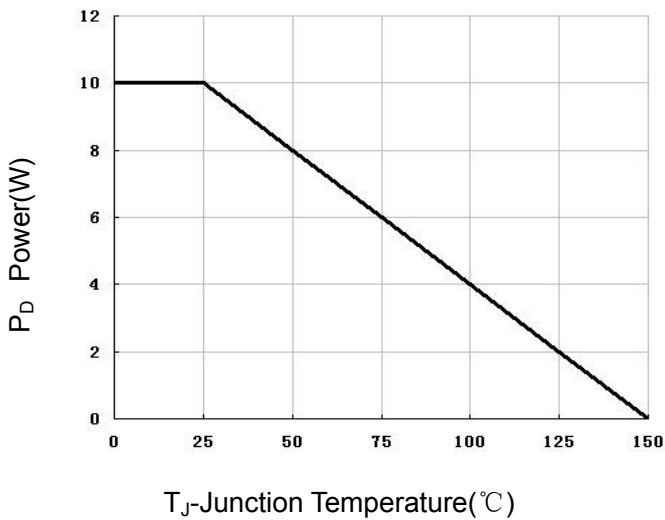


Figure 3 Power Dissipation

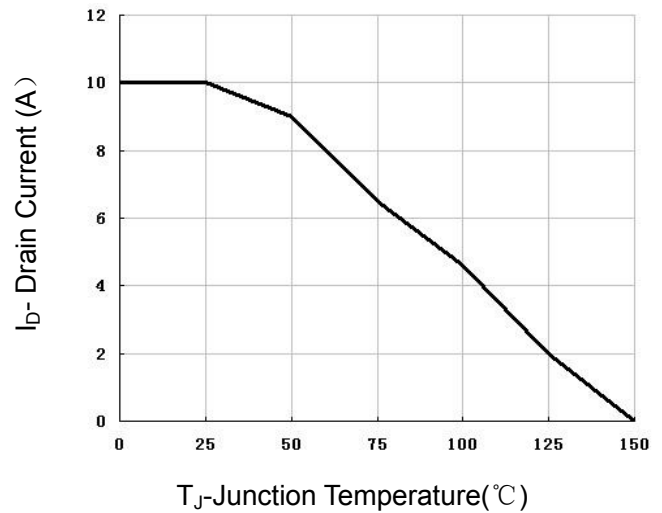


Figure 4 Drain Current

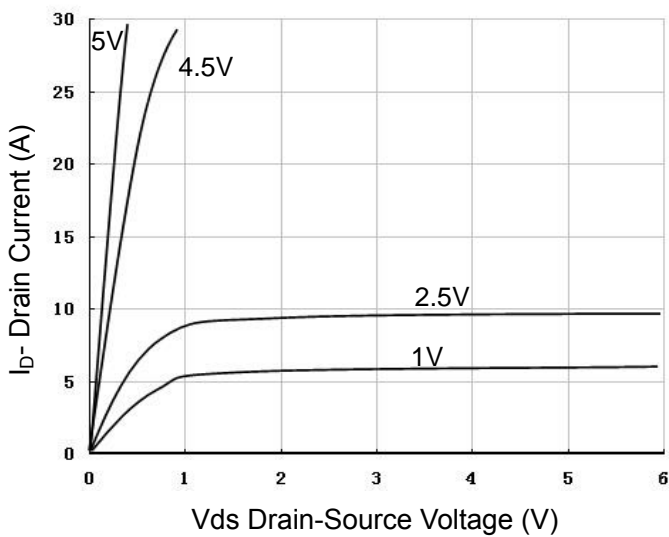


Figure 5 Output Characteristics

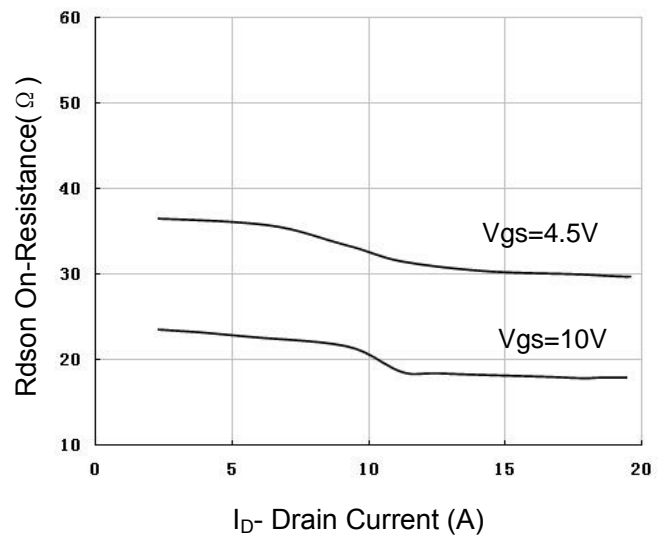


Figure 6 Drain-Source On-Resistance

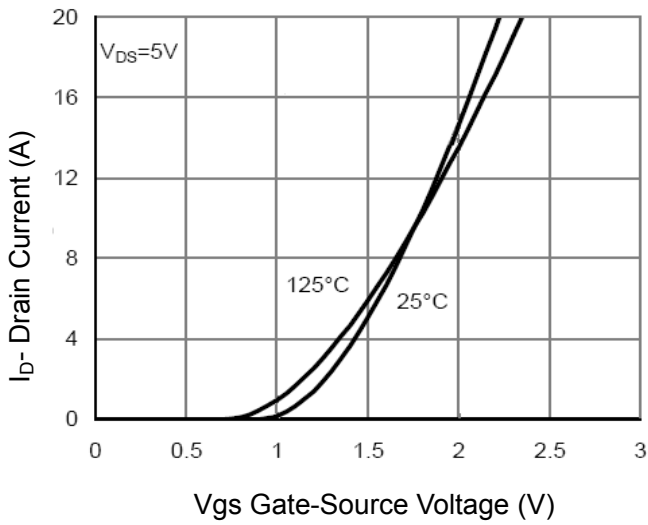


Figure 7 Transfer Characteristics

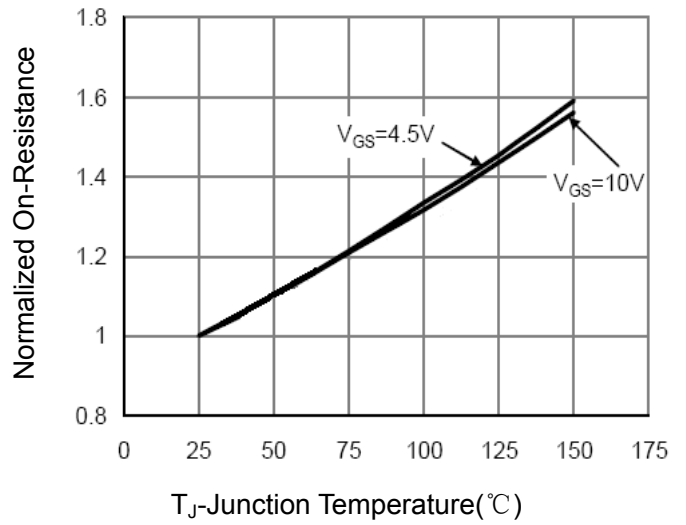


Figure 8 Drain-Source On-Resistance

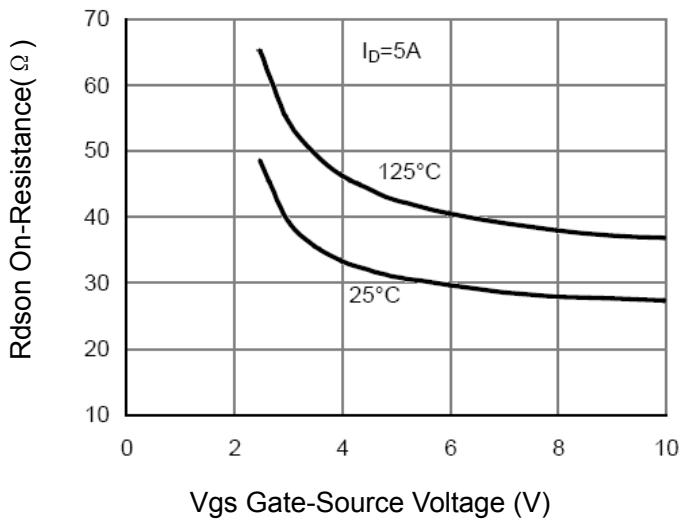


Figure 9 Rdson vs Vgs

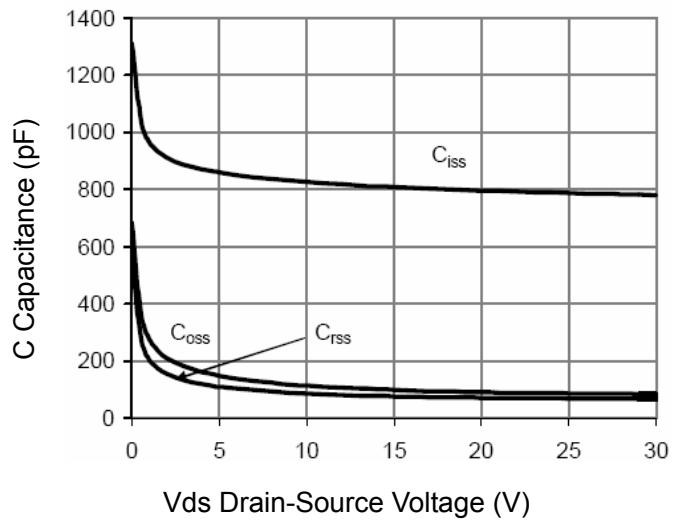


Figure 10 Capacitance vs Vds

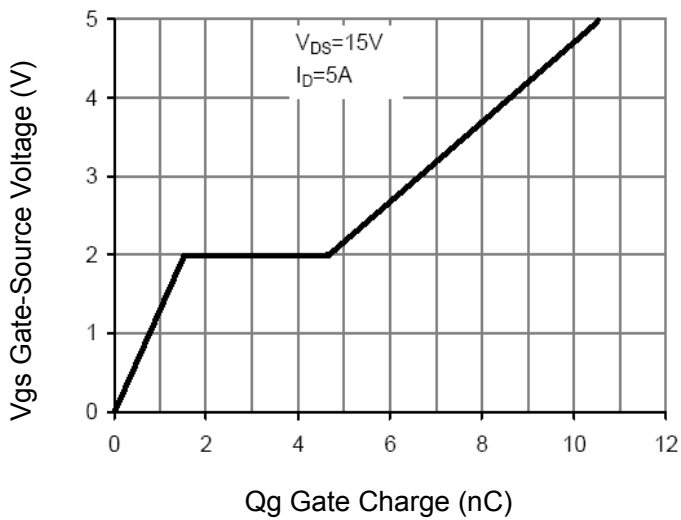


Figure 11 Gate Charge

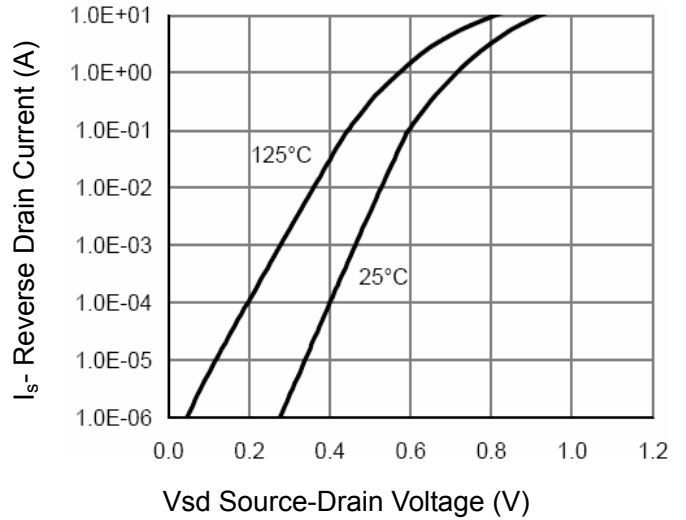


Figure 12 Source- Drain Diode Forward

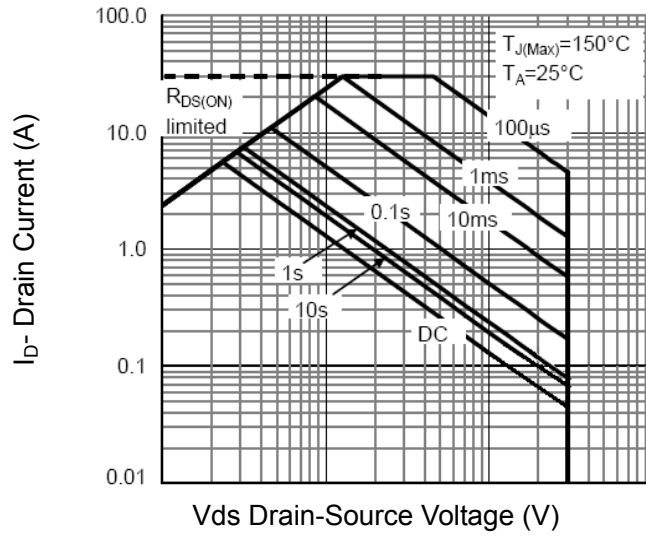


Figure 13 Safe Operation Area

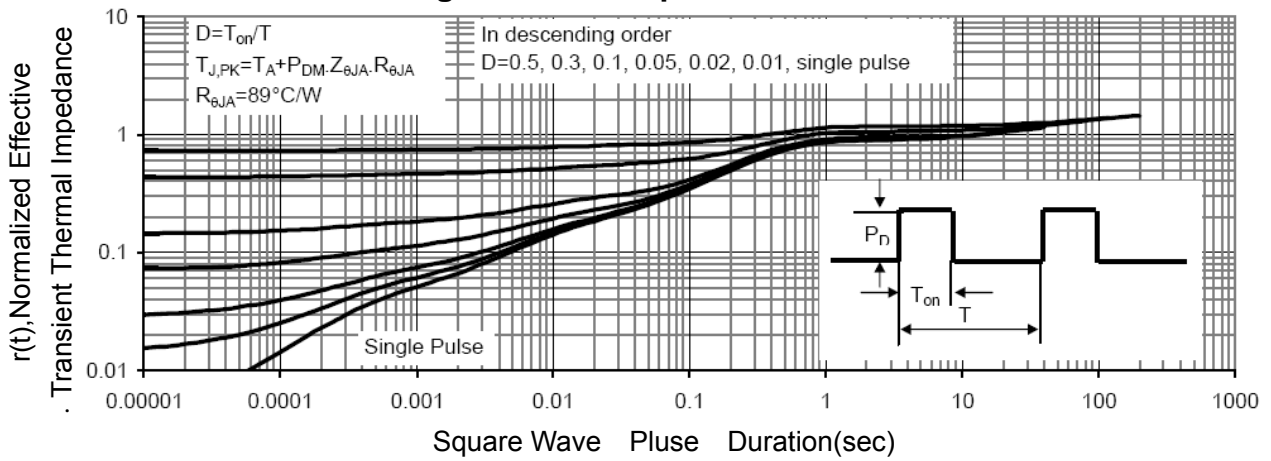


Figure 14 Normalized Maximum Transient Thermal Impedance