

HY5012W-VB Datasheet

N-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY

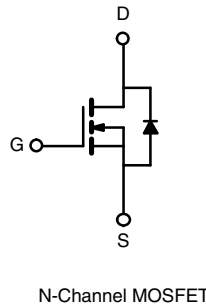
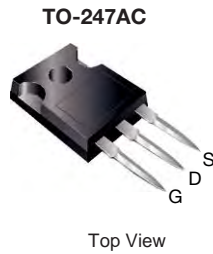
V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.002
I_D (A) ^a	320
Configuration	Single

FEATURES

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25^\circ\text{C}^a$	I_D	320	A
	$T_C = 125^\circ\text{C}$		240	
Continuous Source Current (Diode Conduction) ^a		I_S	320	
Pulsed Drain Current ^b		I_{DM}	1220	
Single Pulse Avalanche Current	$L = 0.1$ mH	I_{AS}	123	mJ
Single Pulse Avalanche Energy		E_{AS}	366	
Maximum Power Dissipation ^b	$T_C = 25^\circ\text{C}$	P_D	650	W
	$T_C = 125^\circ\text{C}$		183	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R_{thJA}	40	$^\circ\text{C/W}$
Junction-to-Case (Drain)		R_{thJC}	0.6	

Notes

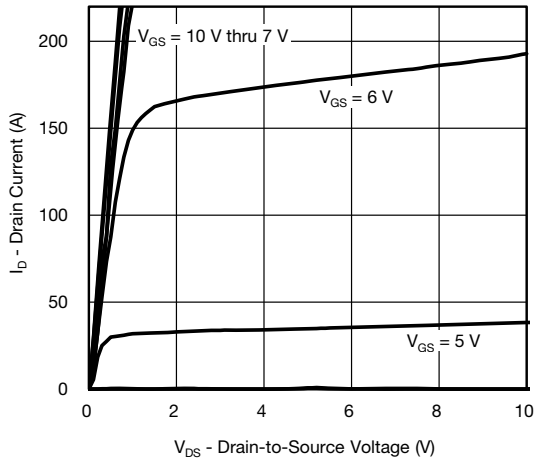
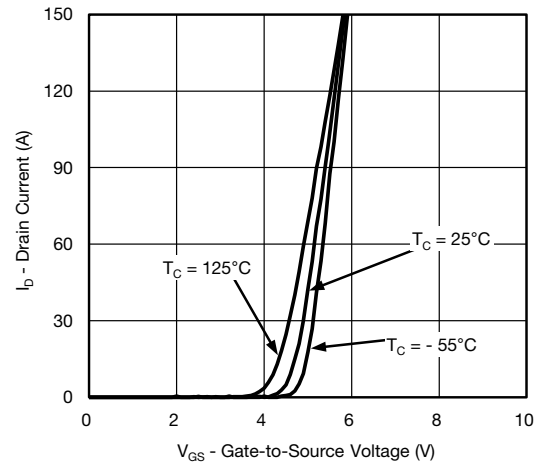
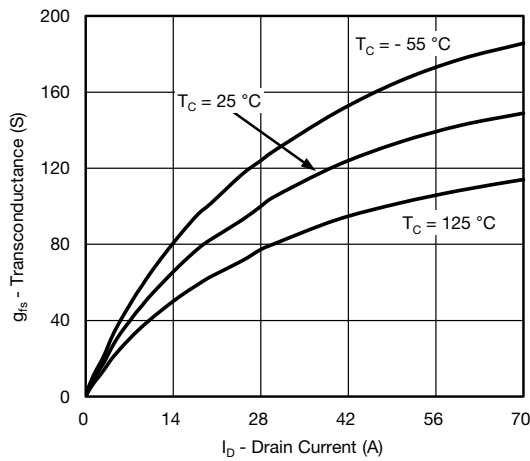
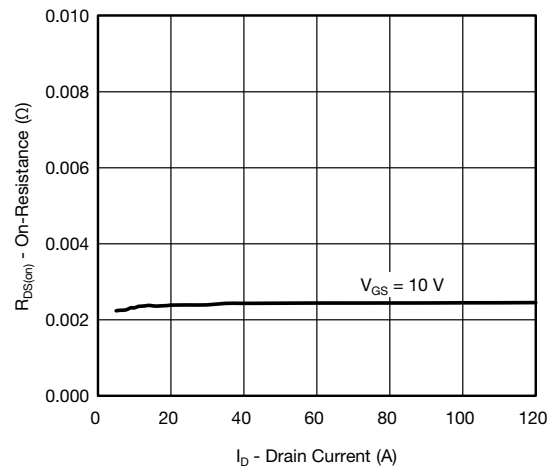
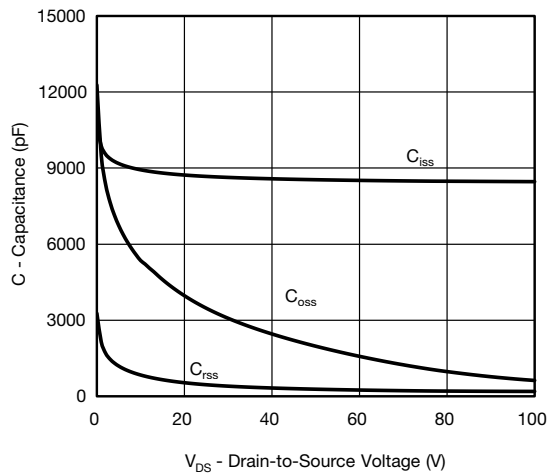
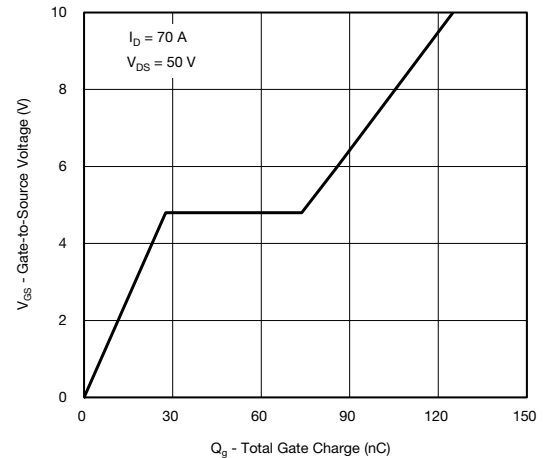
- Base on $T_C = 25^\circ\text{C}$.
- Pulse test; pulse width ≤ 300 μs , duty cycle $\leq 2\%$.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

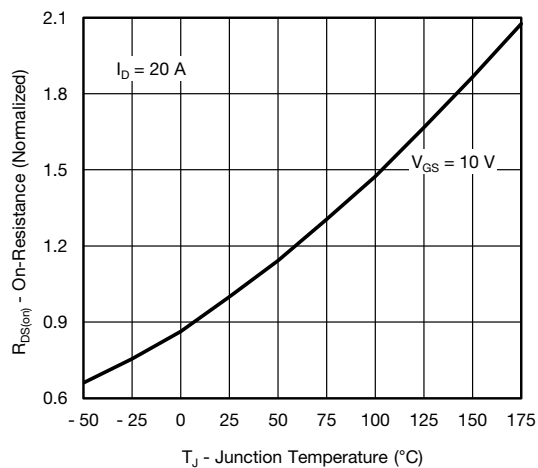
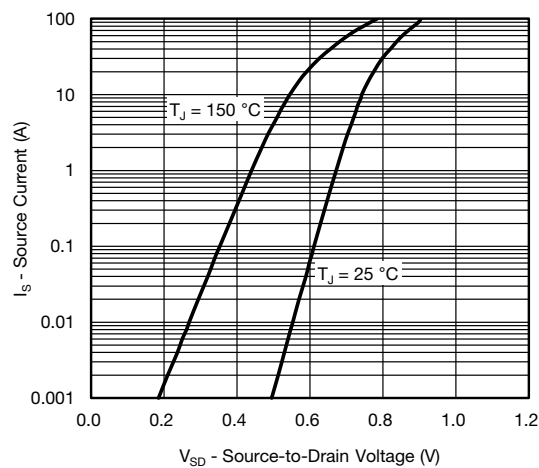
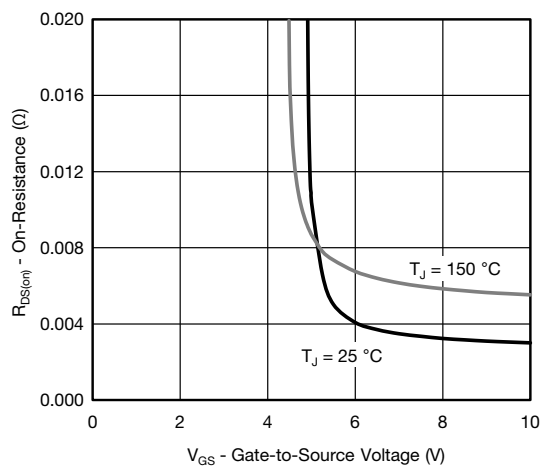
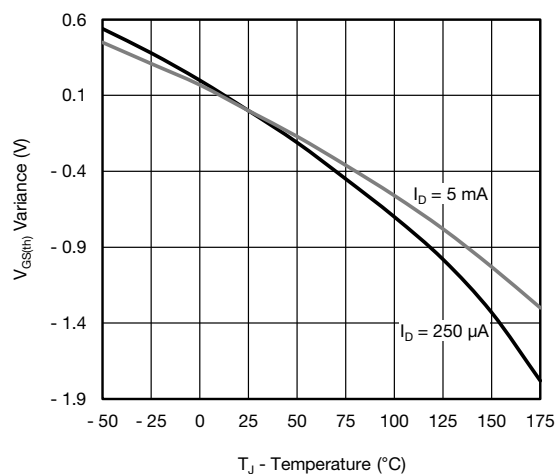
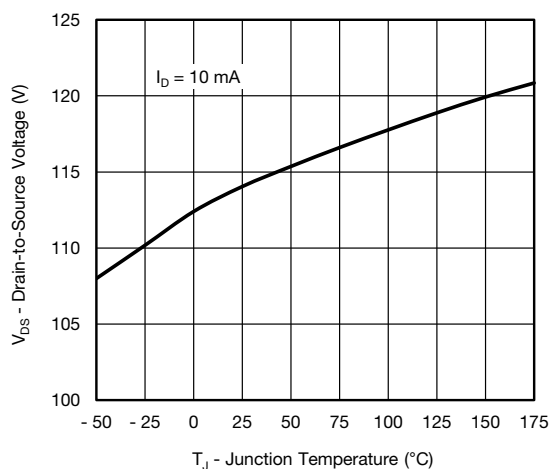
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		100	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 100 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 100 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 100 V, T _J = 175 °C	-	-	500	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	120	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 20 A	-	0.0020	-	Ω
		V _{GS} = 10 V	I _D = 30 A, T _J = 125 °C	--	0.0054	-	
		V _{GS} = 10 V	I _D = 30 A, T _J = 175 °C	-	0.0080	-	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 30 A		-	82	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	9780	12230	pF
Output Capacitance	C _{oss}			-	3070	3840	
Reverse Transfer Capacitance	C _{rss}			-	305	385	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 50 V, I _D = 70 A	-	125	190	nC
Gate-Source Charge ^c	Q _{gs}			-	28	-	
Gate-Drain Charge ^c	Q _{gd}			-	46	-	
Gate Resistance	R _g	f = 1 MHz		1.6	3.3	5	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 0.7 Ω I _D ≅ 70 A, V _{GEN} = 10 V, R _g = 1 Ω		-	16	25	ns
Rise Time ^c	t _r			-	110	165	
Turn-Off Delay Time ^c	t _{d(off)}			-	40	60	
Fall Time ^c	t _f			-	12	20	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	480	A
Forward Voltage	V _{SD}	I _F = 100 A, V _{GS} = 0		-	0.9	1.5	V

Notes

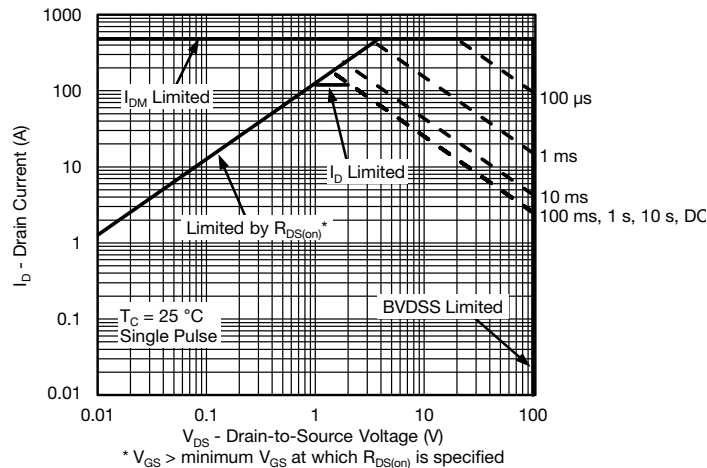
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

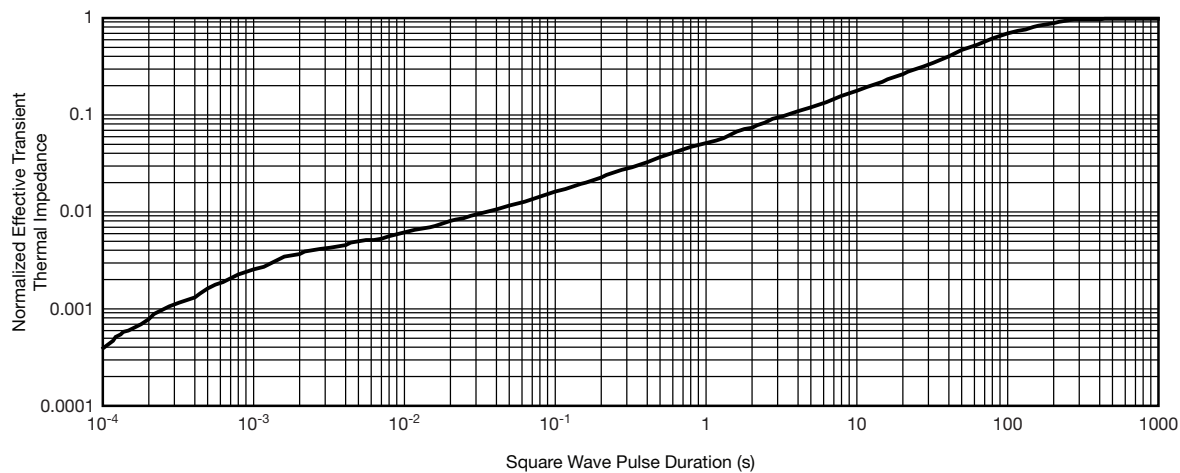
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Drain Source Breakdown vs. Junction Temperature

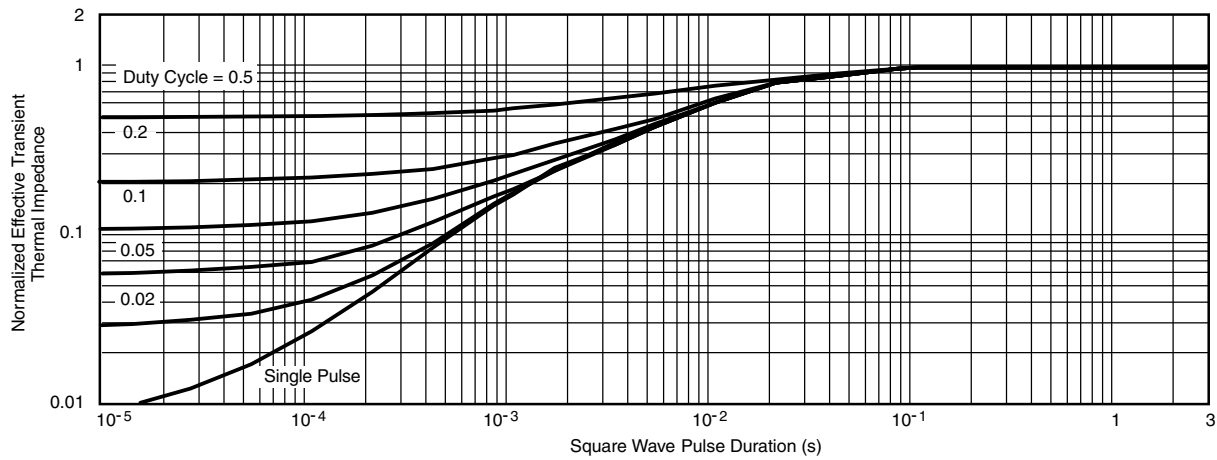
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)


Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^{\circ}\text{C}$)
- are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

Lead Assignments

- Gate
- Drain
- Source
- Drain

Top View (Left): Shows dimensions E, B, S, Q, R/2, 2 x R (2), D, L, L1, C, 2 x b2, 3 x b, 2 x e, b4, and feature 1. Includes a feature control frame: $\oplus 0.10 \text{ M C A M}$.

Side View (Middle): Shows dimensions A, A2, A, D, C, A1, and feature 4. Includes a feature control frame: $\oplus 0.10 \text{ M C A M}$.

Bottom View (Right): Shows dimensions D2, D1, E1, and feature 4. Includes a feature control frame: $\oplus 0.01 \text{ M D B M}$. Labels include (Datum B), $\varnothing P$, $\varnothing P1$, Thermal pad, and View A - A.

Section C - C, D - D, E - E (Bottom Right): Shows dimensions (b1, b3, b5), (c), (b, b2, b4), c1, and feature (4). Labels include Planting, Base metal, and Section C - C, D - D, E - E.

View B (Bottom Center): A circular cross-section showing dimensions D, DE, E, C, and C.

	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

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