

# FH15P03B

# -30V P-Channel MOSFET

## Description

FH15P03B series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

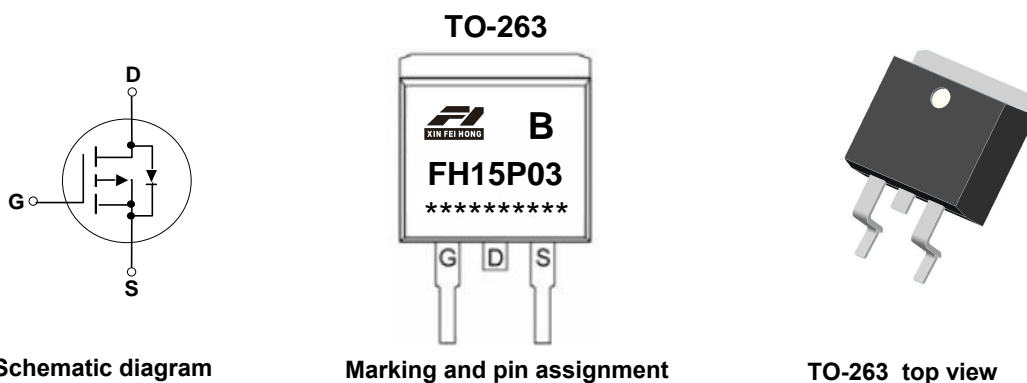
The TO-263 package is widely preferred for all commercial -industrial surface mount applications using infrared reflow technique and suited for high current application due to the low connection resistance. The through-hole version (FH15P03B) are available for low-profile applications.

## General Features

- ◆  $V_{DS} = -30V$ ,  $I_D = -50A$   
 $R_{DS(ON)} = 11m\Omega (MAX) @ V_{GS} = -10V$
- ◆ Improved dv/dt capability
- ◆ Fast switching
- ◆ 100% EAS Guaranteed
- ◆ Green device available

## Applications

- ◆ Motor Drives
- ◆ UPS
- ◆ DC DC Converter



## Absolute Maximum Ratings @ $T_J = 25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Drain Current, $V_{GS} @ 10V$	-50	A
$I_D @ T_C = 100^\circ C$	Drain Current, $V_{GS} @ 10V$	-28	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-200	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	51	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{thj-c}$	Maximum Thermal Resistance Junction-case	2.8	$^\circ C/W$

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA	-30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V,	-	-	-1	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-1.6	-2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -15A	-	8	11	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A	-	13	16	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V, f=1.0MHz	-	2080	-	pF
C <sub>oss</sub>	Output Capacitance		-	370	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	295	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15V, I <sub>D</sub> = -20A, V <sub>GS</sub> = -10V	-	30	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	4.6	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	10	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = -15V, I <sub>D</sub> = -30A, V <sub>GS</sub> = -10V, R <sub>GEN</sub> =2.5Ω	-	11	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	9.4	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	24	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	12	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	-50	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-200	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> = -10A	-	-0.8	-1.2	V

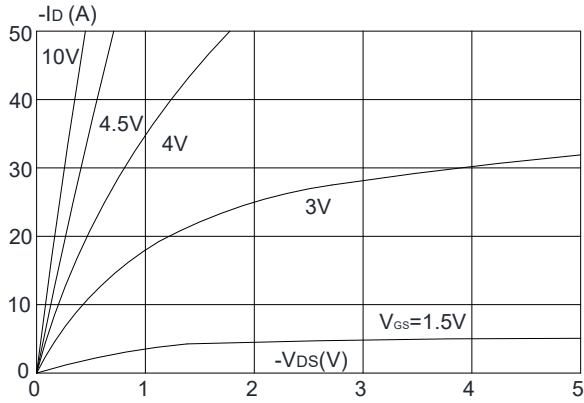
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. E<sub>AS</sub> condition: T<sub>J</sub>=25°C, V<sub>DD</sub>= -15V, V<sub>G</sub>= -10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>= -22A

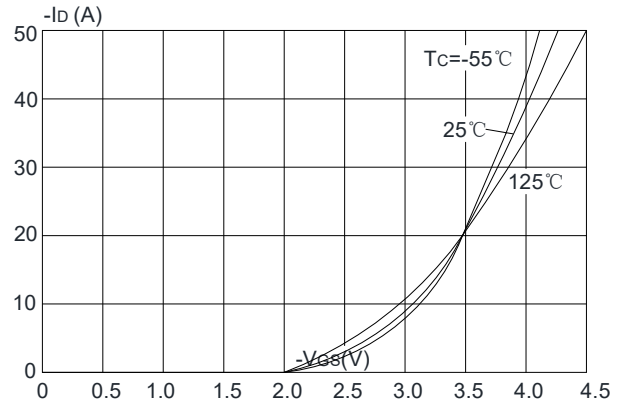
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

## Typical Performance Characteristics

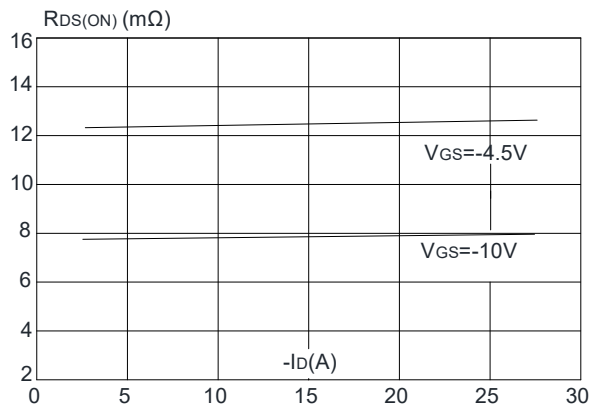
**Figure 1:** Output Characteristics



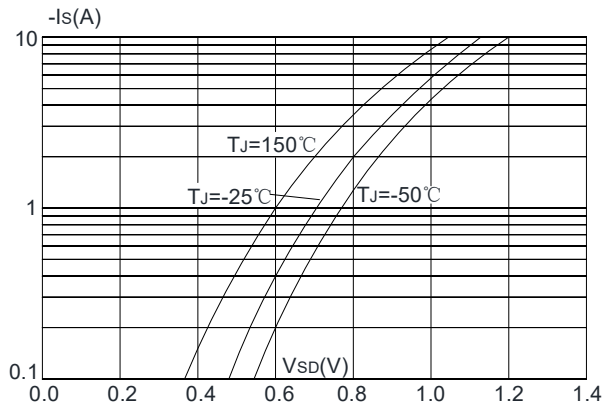
**Figure 2:** Typical Transfer Characteristics



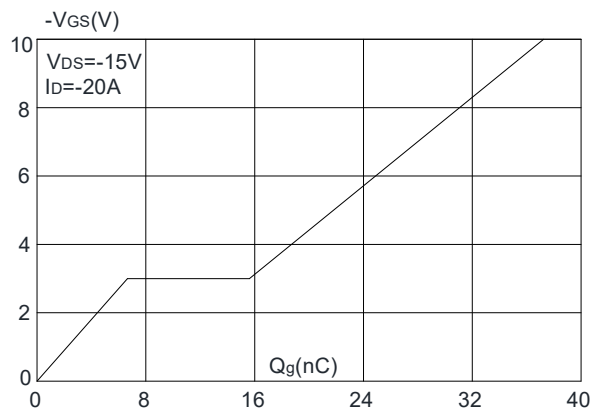
**Figure 3:** On-resistance vs. Drain Current



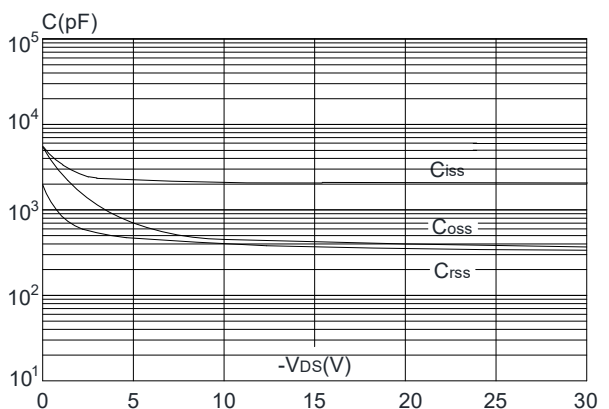
**Figure 4:** Body Diode Characteristics



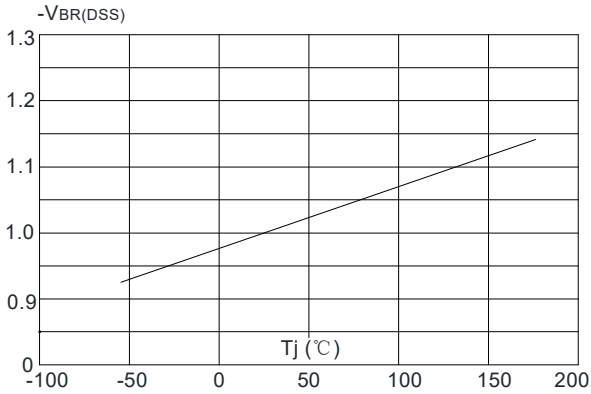
**Figure 5:** Gate Charge Characteristics



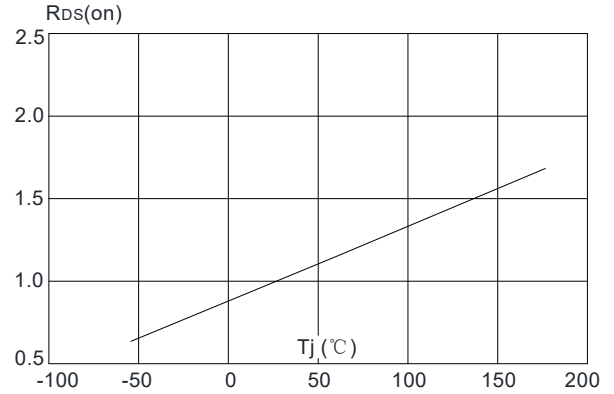
**Figure 6:** Capacitance Characteristics



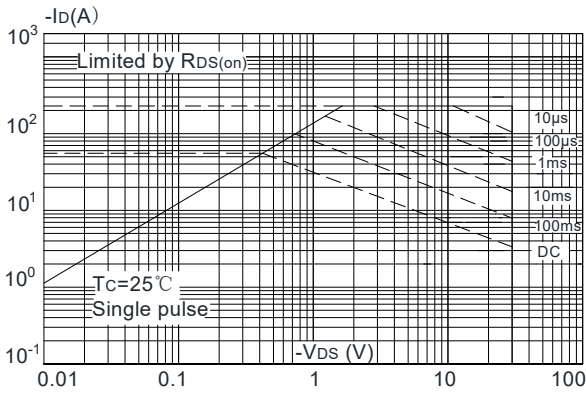
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



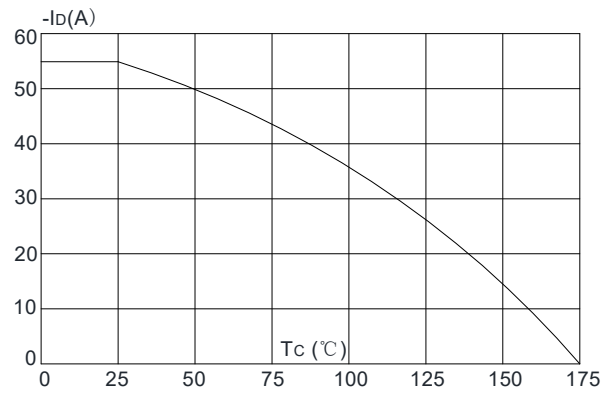
**Figure 8: Normalized on Resistance vs. Junction Temperature**



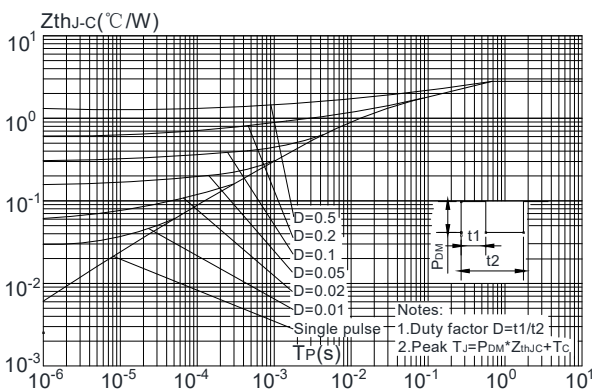
**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Drain Current vs. Case Temperature**

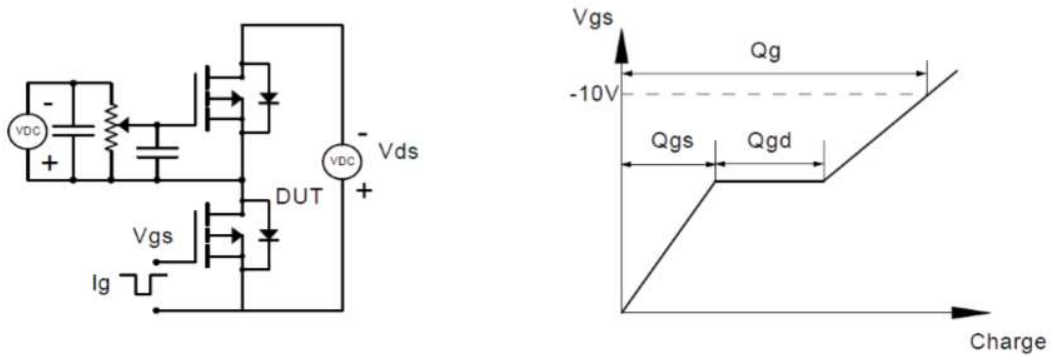


**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

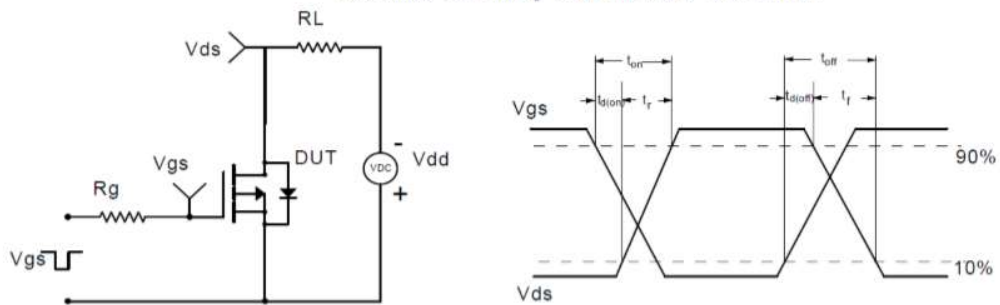


## Test Circuit

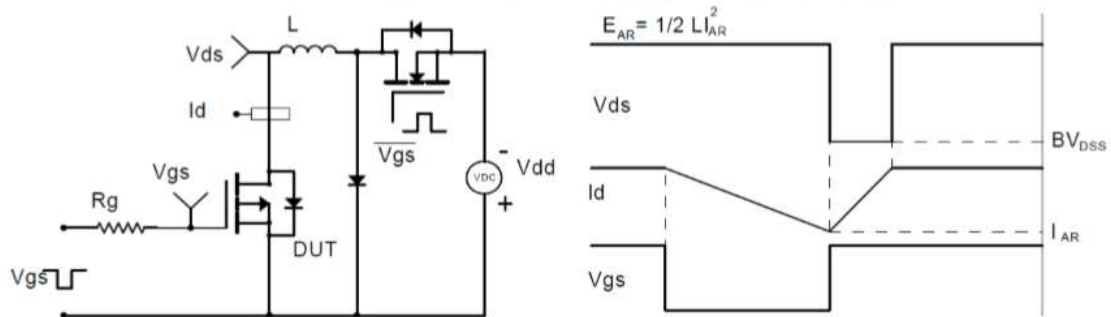
Gate Charge Test Circuit & Waveform



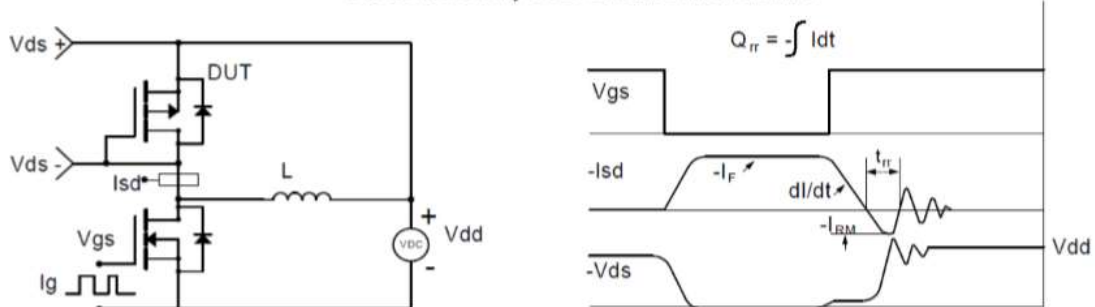
Resistive Switching Test Circuit & Waveforms



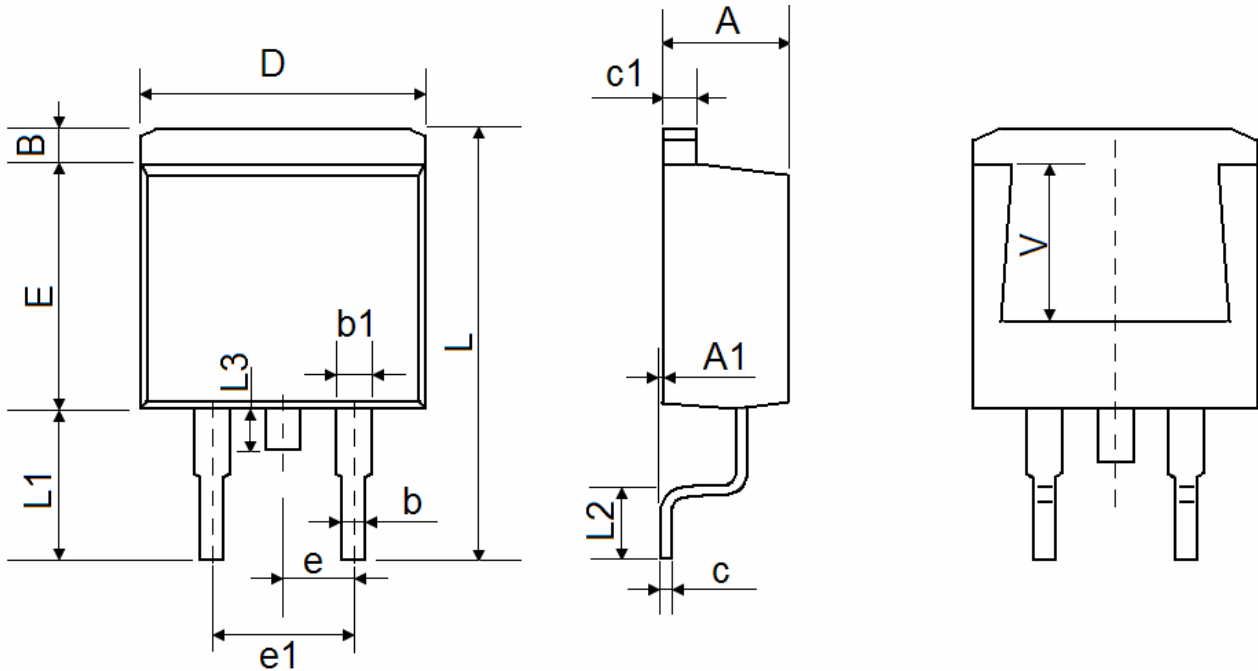
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## Package Information : TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.170	1.370	0.046	0.054
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	15.050	15.450	0.593	0.608
L1	5.080	5.480	0.200	0.216
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF		0.220 REF	