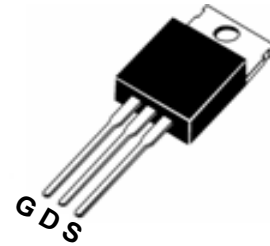




**PIN Connection TO-220AB**

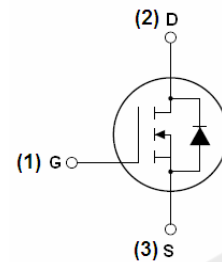


**Features**

- 30V/60A  
 $R_{DS(ON)} = 9m\Omega \text{ typ@ } V_{GS} = 10V$   
 $R_{DS(ON)} = 11.5m\Omega \text{ typ@ } V_{GS} = 4.5V$
- Lead free and Green Device Available

**Application**

- Load Switch



**Marking Diagram**



Y = Year  
 A = Assembly Location  
 WW = Work Week  
 FIR60N03P = Specific Device Code

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

Symbol	Parameter	Maximum	Unit
$V_{DSS}$	Drain-to-Source Voltage	30	V
$V_{GSS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	60
		$T_C = 100^\circ C$	37
$I_{DP}$	Pulsed Drain Current	$T_C = 25^\circ C$	35
PD	Maximum Power Dissipation	$T_C = 25^\circ C$	54
		$T_C = 100^\circ C$	21
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55~150	$^\circ C$

**Thermal Characteristics**

Symbol	Parameter	Typical	Unit
$R_{\theta jc}$	Thermal Resistance-Junction to Case	2.3	$^\circ C/W$
$R_{\theta ja}$	Thermal Resistance-Junction to Ambient	62.5	

**Electrical Characteristics** (TA=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	—	—	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V$	—	—	1	μA
		$T_J=85^\circ C$	—	—	10	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.7	3	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	—	—	±100	nA
$R_{DS(on)}^1$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=15A$	—	8.5	10	mΩ
		$V_{GS}=4.5V, I_D=15A$	—	12	15	
<b>Diode Characteristics</b>						
$V_{SD}^1$	Diode Forward Voltage	$I_{SD}=15A, V_{GS}=0V$	—	0.88	1.3	V
$I_S$	Diode Continuous Forward Current				55	A
$t_{rr}$	Reverse Recovery Time	$I_F=15A,$	—	23		ns
$Q_{rr}$	Reverse Recovery Charge	$dI/dt=100A/\mu s$	—	15		nC
<b>Dynamic Characteristics<sup>2</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V,$ Frequency=1MHz	—	1.5	—	Ω
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=30V$ Frequency=1MHz	—	920		pF
$C_{oss}$	Output Capacitance		—	187		
$C_{riss}$	Reverse Transfer Capacitance		—	130		
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, R_L=30\Omega$ $I_D=15A, V_{GS}=10V$ $R_G=6\Omega$	—	15		ns
$t_r$	Turn-On Rise Time		—	25		
$t_{d(off)}$	Turn-Off Delay Time		—	60		
$t_f$	Turn-Off Fall Time		—	17		
<b>Gate Charge Characteristics<sup>2</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V$ $I_D=15A$	—	22		nC
$Q_{gs}$	Gate-to-Source Charge		—	5		
$Q_{gd}$	Gate-to-Drain Charge		—	6.5		

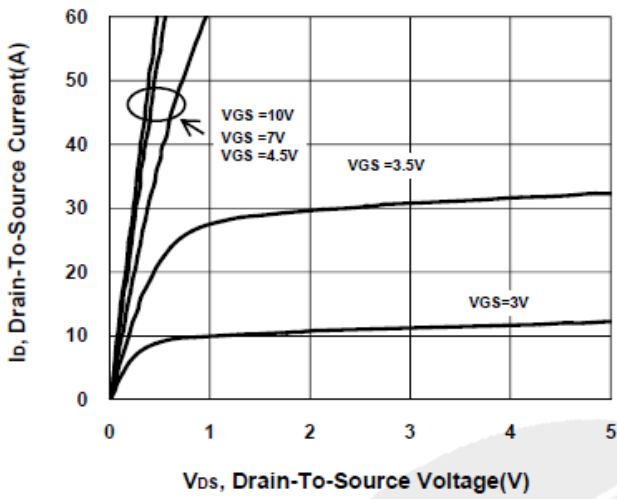
Note: 1: Pulse test; pulse width  $\leq 300ns$ , duty cycle  $\leq 2\%$ .

2: Guaranteed by design, not subject to production testing.

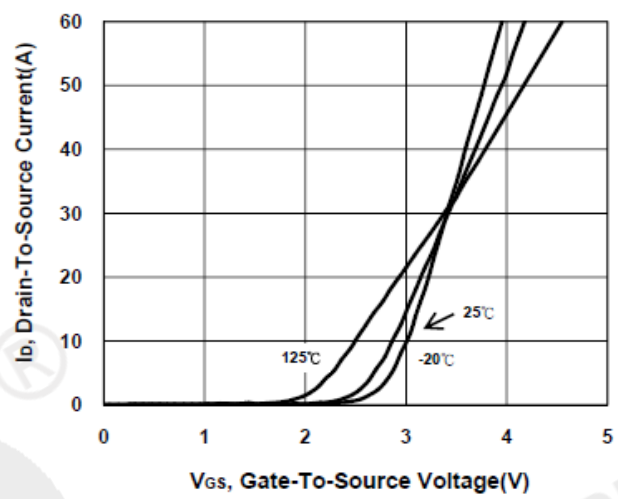


# Typical Operating Characteristics

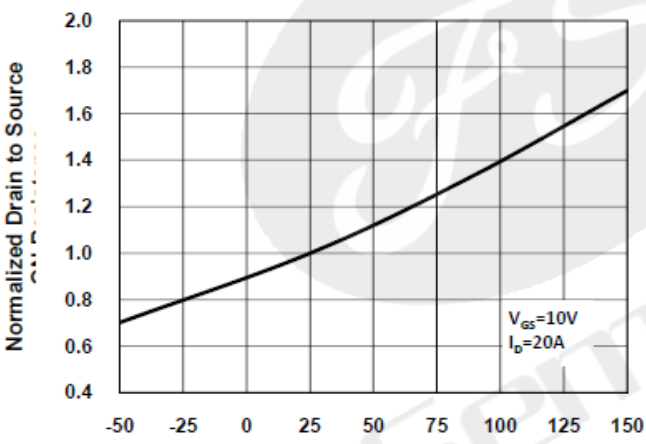
## Output Characteristics



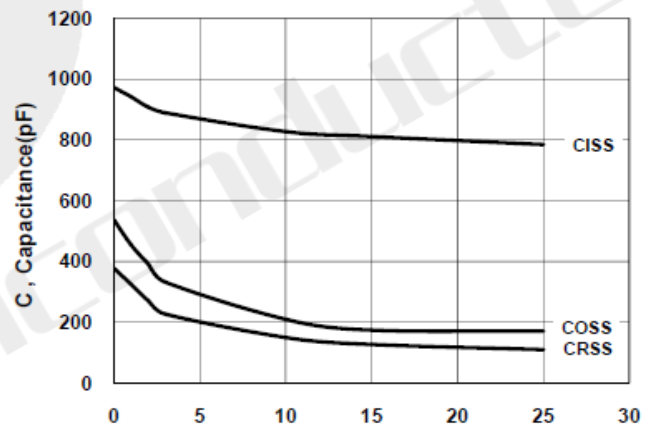
## Transfer Characteristics



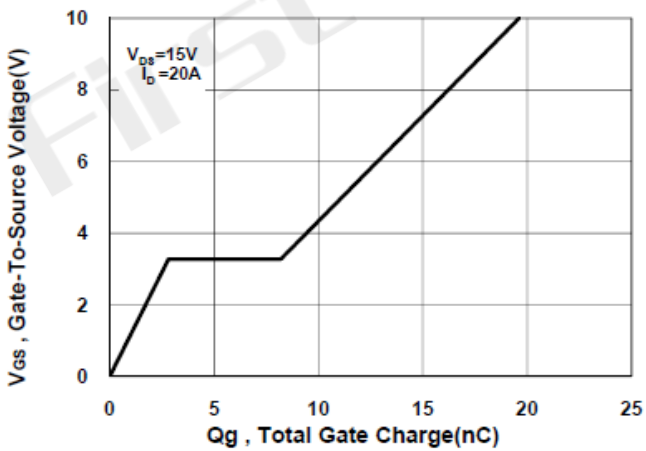
## On-Resistance VS Temperature



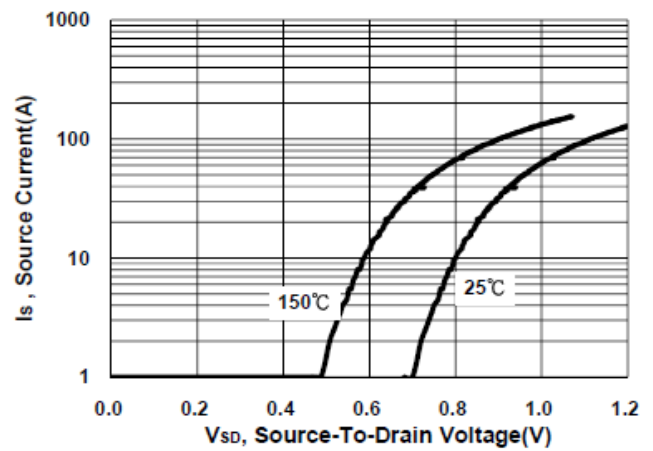
## Capacitance Characteristic



## Gate charge Characteristics



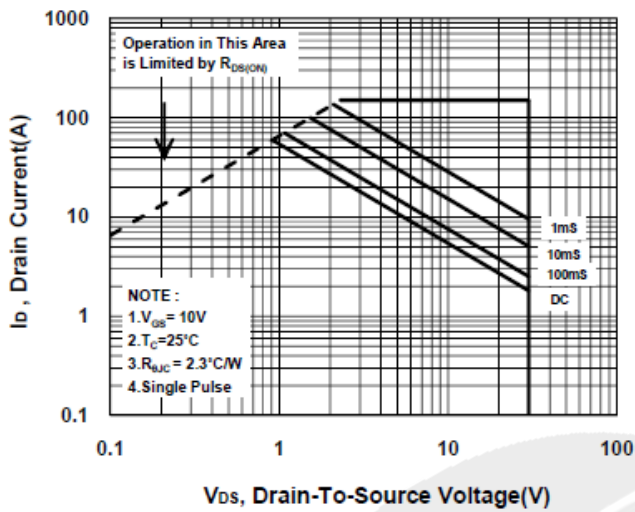
## Source-Drain Diode Forward Voltage



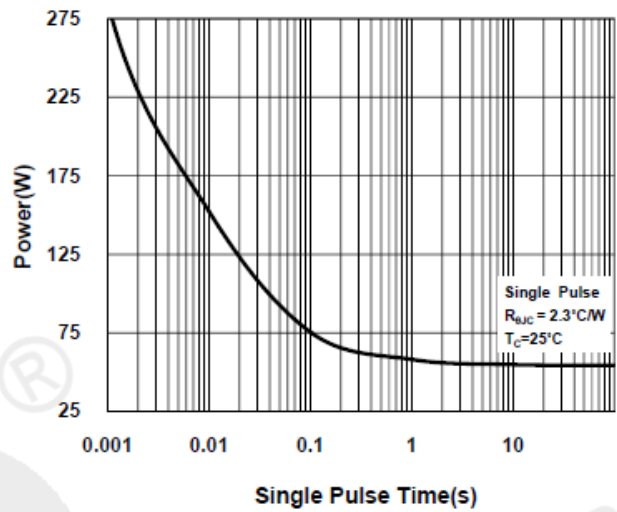


# Typical Operating Characteristics

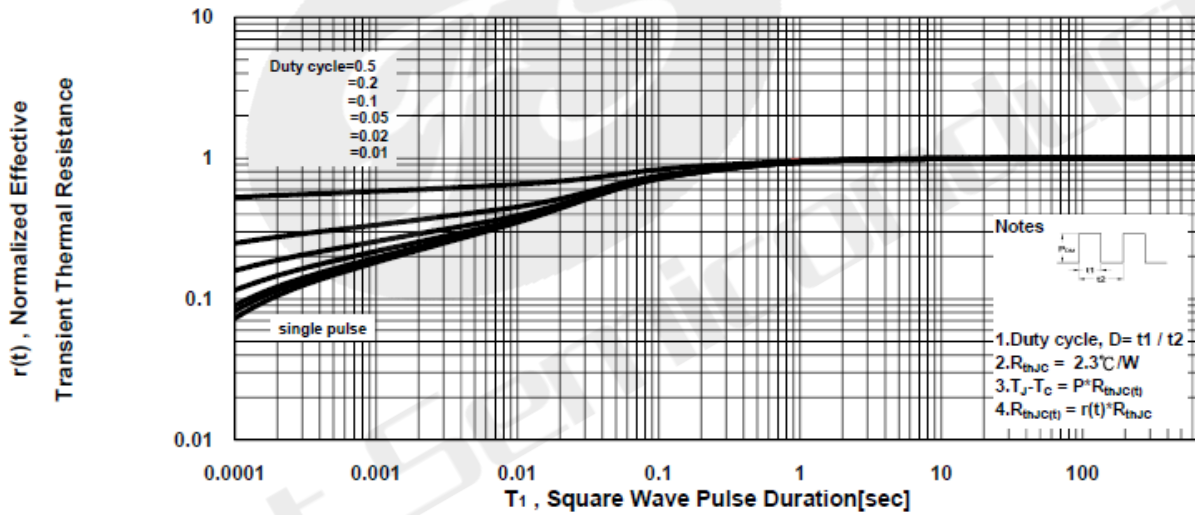
## Safe Operating Area



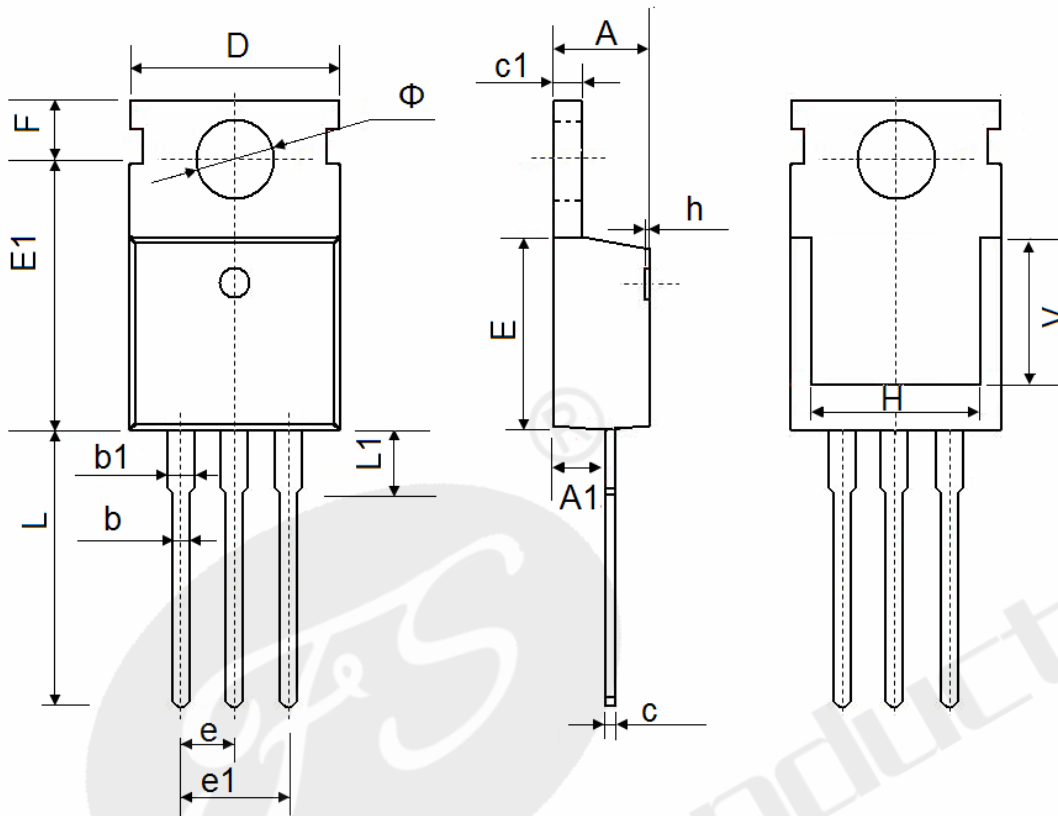
## Single Pulse Maximum Power Dissipation



## Transient Thermal Response Curve



TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150



Declaration

- FIRST reserves the right to change the specifications, the same specifications of products due to different packaging line mold, the size of the appearance will be slightly different, shipped in kind, without notice! Customers should obtain the latest version information before ordering, and verify whether the relevant information is complete and up-to-date.
- Any semiconductor product under certain conditions has the possibility of failure or failure, The buyer has the responsibility to comply with safety standards and take safety measures when using FIRST products for system design and manufacturing, To avoid To avoid potential failure risks, which may cause personal injury or property damage!
- Product promotion endless, our company will wholeheartedly provide customers with better products!

**ATTACHMENT**

Revision History

Date	REV	Description	Page
2018.01.01	1.0	Initial release	