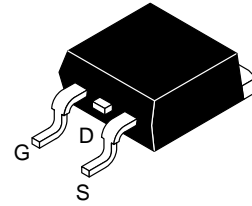




PIN Connection TO-263

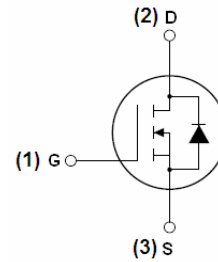
FEATURES

- $V_{DS}$ , 100V  
 $R_{DS(ON)}$ , 3.6mΩ (max.) @  $V_{GS}=10V$   
 $I_D$ , 170A
- Low On-Resistance
- Low Input Capacitance
- Low Miller Charge
- Low Input/Output Leakage



APPLICATIONS

- Lithium-Ion Secondary Batteries
- Load Switch
- DC-DC converters and Off-line UPS



Marking Diagram

- Y = Year
- A = Assembly Location
- WW = Work Week
- FIR170N10R = Specific Device Code

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	$T_C=25^{\circ}C$	170
		$T_C=100^{\circ}C$	138
Drain Current-Pulsed <sup>Note 1</sup>	$I_{DM}$	550	A
Avalanche Current	$I_{AS}$	40	A
Avalanche Energy, $L=1.0mH$	$E_{AS}$	800	mJ
Maximum Power Dissipation	$P_D$	$T_C=25^{\circ}C$	260
		$T_C=100^{\circ}C$	104
Storage Temperature Range	$T_{STG}$	-55 to +150	$^{\circ}C$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^{\circ}C$

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient <sup>Note 2</sup>	$R_{\theta JA}$	Steady State	-	-	62	$^{\circ}C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	0.48	$^{\circ}C/W$

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

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_{DS} = 250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{DS} = 250\mu A$	2	-	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_{DS} = 50A$	-	3.0	3.6	m $\Omega$

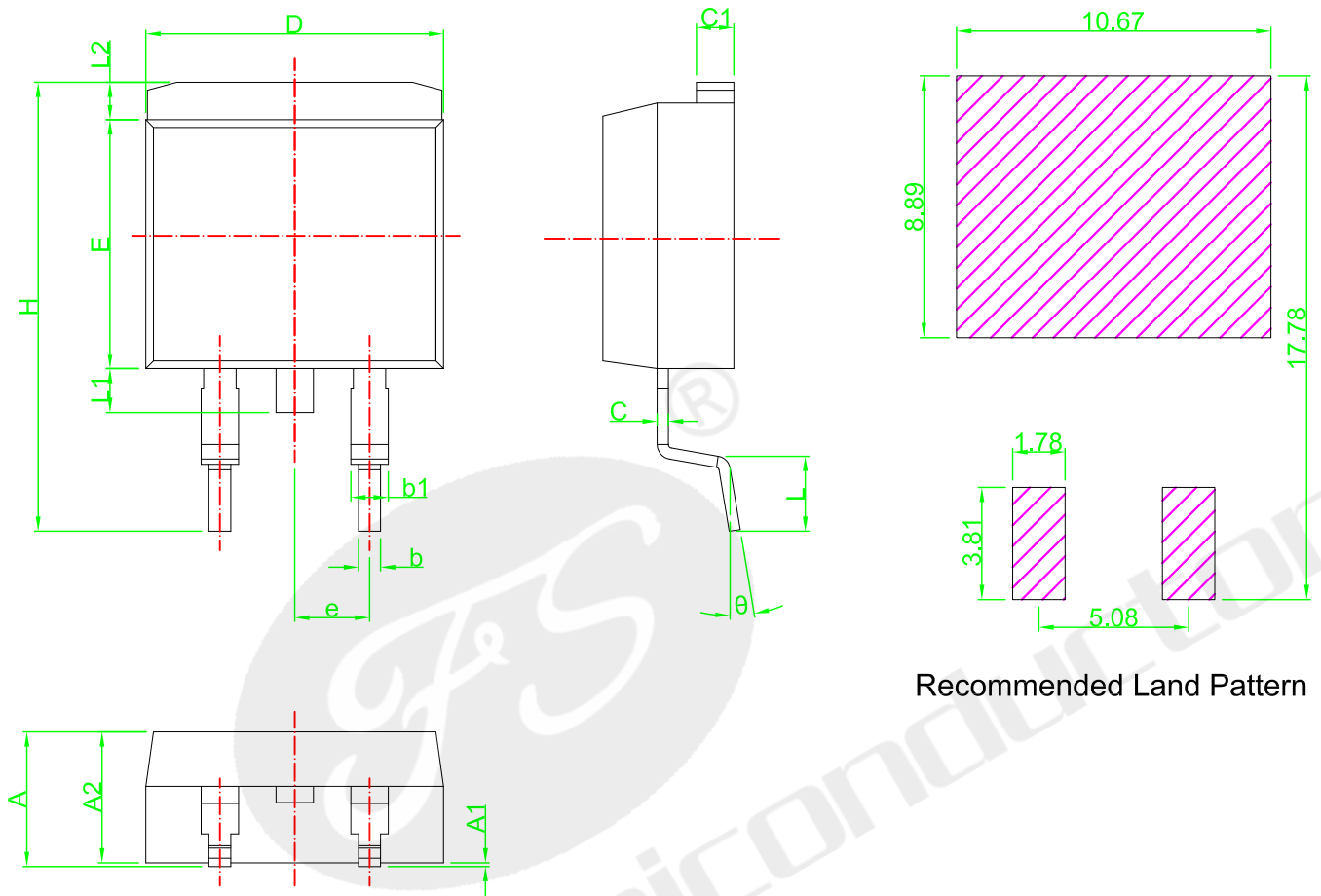
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	$C_{iss}$	$V_{DS} = 50V, V_{GS} = 0V, f = 1\text{MHz}$	-	5349	-	pF
Output Capacitance	$C_{oss}$		-	1786	-	
Reverse Transfer Capacitance	$C_{rss}$		-	25	-	
Gate Resistance	$R_g$	$V_{GS} = 0V, V_{DS} = 0V, f = 1\text{MHz}$	-	2	-	$\Omega$

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DS} = 50V, V_{GS} = 10V, R_{GEN} = 3\Omega$	-	19.8	-	ns
Rise Time	$t_r$		-	7.1	-	
Turn-Off Delay Time	$T_{d(off)}$		-	61.4	-	us
Fall Time	$t_f$	-	9.2	-		
Total Gate Charge at 4.5V	$Q_g$	$V_{DS} = 50V, I_{DS} = 50A, V_{GS} = 10V$	-	33	-	nC
Gate to Source Gate Charge	$Q_{gs}$		-	16	-	
Gate to Drain "Miller" Charge	$Q_{gd}$		-	8	-	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 1A$	-	-	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 50A, di/dt = 500A/\mu s, T_J = 25^\circ\text{C}$	-	-	60	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	-	135	nC

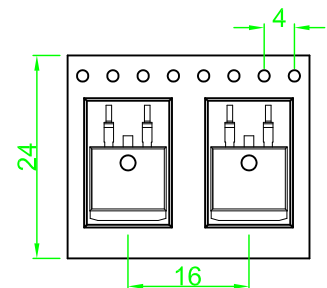
## Notes:

- Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta IC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 in still air.



Recommended Land Pattern

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.06	5.08	0.160	0.200
A1	0.00	0.25	0.000	0.010
A2	4.06	4.83	0.160	0.190
b	0.50	1.00	0.020	0.039
b1	1.14	1.78	0.045	0.070
C	0.33	0.74	0.013	0.029
C1	1.14	1.65	0.045	0.065
D	9.65	10.67	0.380	0.420
E	8.38	9.65	0.330	0.380
e	2.54 TYP		0.100 TYP	
H	14.60	15.88	0.575	0.625
L	1.78	2.84	0.070	0.112
L1	1.20	1.78	0.047	0.070
L2	1.17	1.68	0.046	0.066
θ	0°	8°	0°	8°



Q'ty / Reel	Reel Size
800pcs	13"



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	