FDB3652 / FDP3652 / FDI3652

N-Channel PowerTrench® MOSFET
100V, 61A, 16mΩ

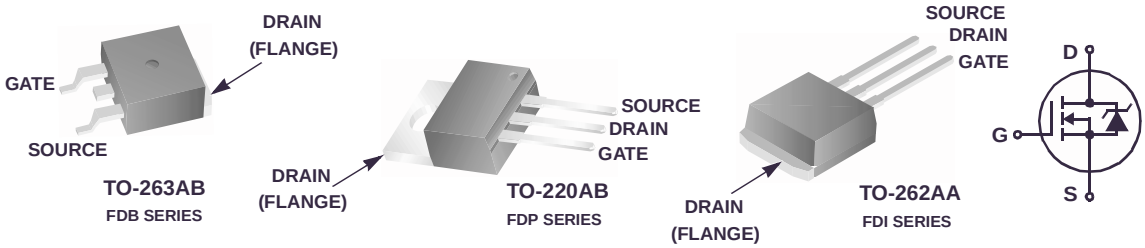
Features

- $r_{DS(ON)}$ = 14mΩ (Typ.), V_{GS} = 10V, I_D = 61A
- Q_g(tot) = 41nC (Typ.), V_{GS} = 10V
- Low Miller Charge
- Low Q_{RR} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- Qualified to AEC Q101

Formerly developmental type 82769

Applications

- DC/DC Converters and Off-line UPS
- Distributed Power Architectures and VRMs
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier
- Direct Injection / Diesel Injection Systems
- 42V Automotive Load Control
- Electronic Valve Train Systems



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (T_C = 25°C, V_{GS} = 10V)	61	A
	Continuous (T_C = 100°C, V_{GS} = 10V)	43	A
	Continuous (T_{amb} = 25°C, V_{GS} = 10V) with $R_{\theta JA}$ = 43°C/W)	9	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	182	mJ
P_D	Power dissipation	150	W
	Derate above 25°C	1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-220, TO-263, TO-262	1.0	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-220, TO-263, TO-262 (Note 2)	62	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263, 1in^2 copper pad area	43	°C/W

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: http://www.aecouncil.com/
Reliability data can be found at: http://www.fairchildsemi.com/products/discrete/reliability/index.html.
All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB3652	FDB3652	TO-263AB	330mm	24mm	800 units
FDP3652	FDP3652	TO-220AB	Tube	N/A	50 units
FDI3652	FDI3652	TO-262AA	Tube	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Off Characteristics							
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250µA, V_{GS} = 0V		105	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V V_{GS} = 0V		-	-	1	µA
			T_C= 150°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V		-	-	±100	nA
On Characteristics							
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250µA		2	-	4	V
$r_{DS(ON)}$	Drain to Source On Resistance	I_D = 61A, V_{GS} = 10V		-	0.014	0.016	Ω
		I_D = 30A, V_{GS} = 6V		-	0.018	0.026	
		I_D = 61A, V_{GS} = 10V, T_J = 175°C		-	0.035	0.043	
Dynamic Characteristics							
C_{ISS}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz		-	2880	-	pF
C_{OSS}	Output Capacitance			-	390	-	pF
C_{RSS}	Reverse Transfer Capacitance			-	100	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V	V_{DD} = 50V I_D = 61A I_g = 1.0mA		41	53	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 2V		-	5	6.5	nC
Q_{gs}	Gate to Source Gate Charge			-	15	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau			-	10	-	nC
Q_{gd}	Gate to Drain “Miller” Charge			-	10	-	nC
Switching Characteristics (V_{GS} = 10V)							
t_{ON}	Turn-On Time	V_{DD} = 50V, I_D = 61A V_{GS} = 10V, R_{GS} = 6.8Ω		-	-	146	ns
$t_{d(ON)}$	Turn-On Delay Time			-	12	-	ns
t_r	Rise Time			-	85	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time			-	26	-	ns
t_f	Fall Time			-	45	-	ns
t_{OFF}	Turn-Off Time			-	-	107	ns
Drain-Source Diode Characteristics							
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 61A		-	-	1.25	V
		I_{SD} = 30A		-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 61A, dI_{SD}/dt = 100A/µs		-	-	62	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 61A, dI_{SD}/dt = 100A/µs		-	-	45	nC

Notes:
1: Starting T_J = 25°C, L = 0.228mH, I_{AS} = 40A.
2: Pulse Width = 100s

Typical Characteristics T_C = 25°C unless otherwise noted

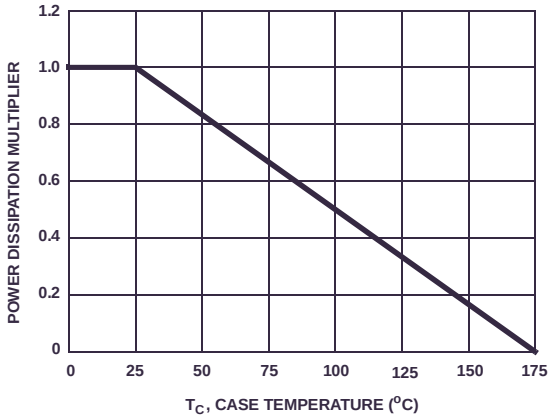


Figure 1. Normalized Power Dissipation vs Ambient Temperature

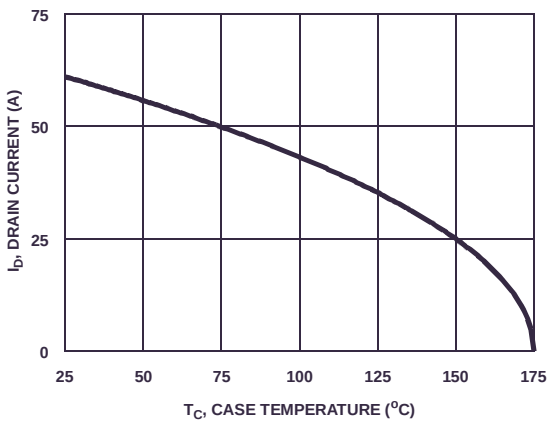


Figure 2. Maximum Continuous Drain Current vs Case Temperature

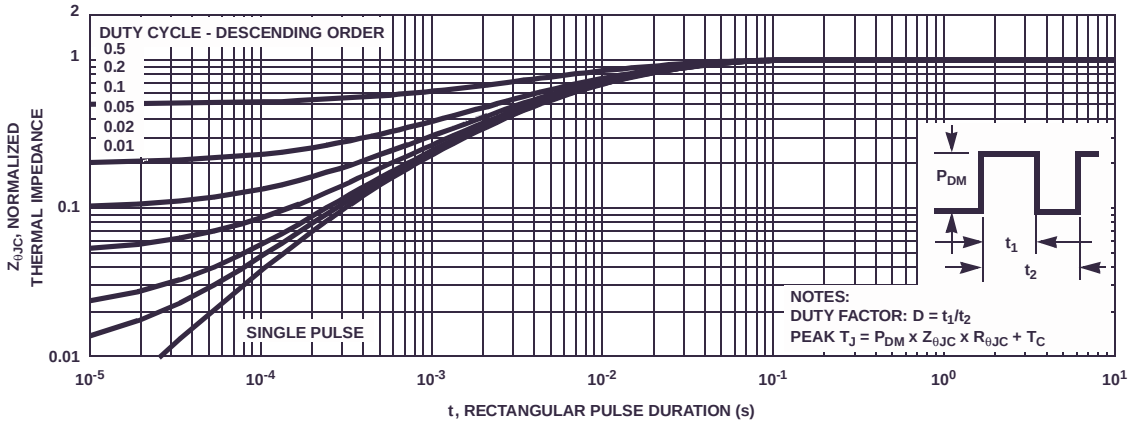


Figure 3. Normalized Maximum Transient Thermal Impedance

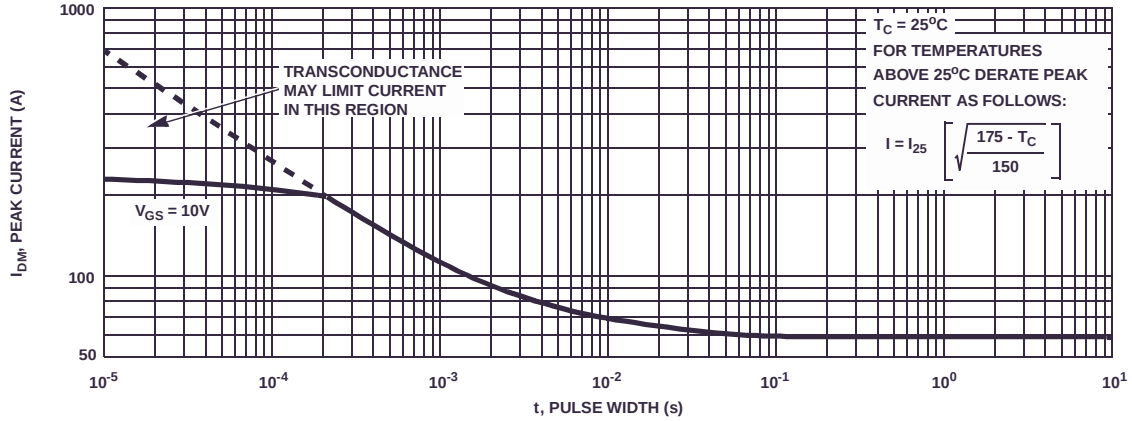


Figure 4. Peak Current Capability