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June 2013

FDMS36101L F085

N-Channel Power Trench® MOSFET **100V**, **38A**, **26m**Ω

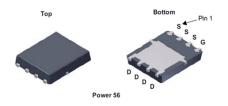
Features

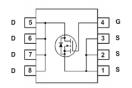
- Typ $r_{DS(on)}$ = 18m Ω at V_{GS} = 10V, I_D = 20A
- Typ $Q_{g(tot)}$ = 70nC at V_{GS} = 10V, I_D = 20A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Integrated Starter/alternator
- Primary Switch for 12V Systems







For current package drawing, please refer to the Fairchild website at www.fairchildsemi.com/packaging

MOSFET Maximum Ratings T_{.1} = 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
	Drain Current - Continuous (V _{GS} =10) (Note 1)	T _C = 25°C	38	А
ID	Pulsed Drain Current	T _C = 25°C	See Figure4	^
E _{AS}	Single Pulse Avalanche Energy	(Note 2)	101	mJ
D	Power Dissipation		94	W
P_{D}	Derate above 25°C		0.63	W/°C
T_J , T_{STG}	Operating and Storage Temperature		-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance Junction to Case		1.6	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance Junction to Ambient	(Note 3)	50	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS36101L	FDMS36101L_F085	Power 56	13"	12mm	3000 units

- 1: Current is limited by bondwire configuration.
- 2: Starting $T_J = 25^{\circ}C$, L = 0.22mH, $I_{AS} = 30.4$ A, $V_{DD} = 100$ V during inductor charging and $V_{DD} = 0$ V during time in avalanche 3: $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

Units

Max

Тур

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

Parameter

Off Characteristics							
B _{VDSS}	Drain to Source Breakdown Voltage	I _D = 250μA, V _{GS}	_S = 0V	100	-	-	V
	I _{DSS} Drain to Source Leakage Current	V _{DS} =100V, T	Г _Ј = 25 ^o C	-	-	1	μΑ
DSS		$V_{GS} = 0V$ T	$\Gamma_{\rm J}$ = 175°C(Note 4)	-	-	1	mA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V$		-	-	±100	nA

Test Conditions

Min

On Characteristics

Symbol

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$		1.0	1.84	3.0	V
	rps(op) Drain to Source On Resistance	I _D = 20A,	$T_{J} = 25^{\circ}C$	-	18	26	mΩ
_		V _{GS} = 10V	$T_J = 175^{\circ}C(Note 4)$	-	45	65	mΩ
DS(on)		I _D = 20A,	$T_{\rm J} = 25^{\rm o}{\rm C}$	-	20	28	mΩ
		V_{GS} = 4.5 V	$T_J = 175^{\circ}C(Note 4)$	-	47	66	mΩ

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		-	3945	-	pF
C _{oss}	Output Capacitance			-	229	-	pF
C _{rss}	Reverse Transfer Capacitance			-	111	-	pF
R_g	Gate Resistance	f = 1MHz		-	1.2	-	Ω
$Q_{g(ToT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	V _{DD} = 50V	-	70	84	nC
Q _{g(th)}	Threshold Gate Charge	$V_{GS} = 0 \text{ to } 2V$ $I_D = 20A$		-	6.8	9	nC
Q_{gs}	Gate to Source Gate Charge		-	-	10.5	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	12	-	nC

Switching Characteristics

t _{on}	Turn-On Time		-	-	24	ns
t _{d(on)}	Turn-On Delay Time		-	15	-	ns
t _r	Rise Time	V _{DD} = 50V, I _D = 20A,	-	7	-	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10V, R_{GEN} = 6\Omega$	-	45	-	ns
t _f	Fall Time		-	3	-	ns
t _{off}	Turn-Off Time		-	-	57	ns

Drain-Source Diode Characteristics

V	Source to Drain Diode Voltage	I _{SD} = 20A, V _{GS} = 0V	-	-	1.25	V
V_{SD}	Source to Drain blode voltage	$I_{SD} = 10A, V_{GS} = 0V$	-	1	1.2	٧
T _{rr}	Reverse Recovery Time	$I_F = 20A$, $dI_{SD}/dt = 100A/\mu s$,	-	43	47	ns
Q _{rr}	Reverse Recovery Charge	V _{DD} =80V	-	71	85	nC

Notes:

^{4:} The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

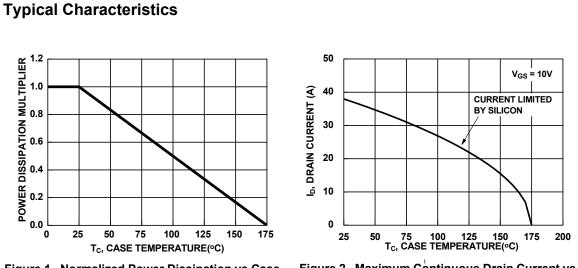


Figure 1. Normalized Power Dissipation vs Case Temperature

Figure 2. Maximum Continuous Drain Current vs Case Temperature

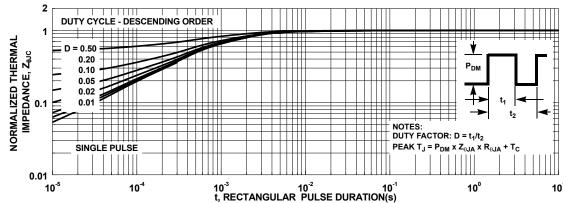


Figure 3. Normalized Maximum Transient Thermal Impedance

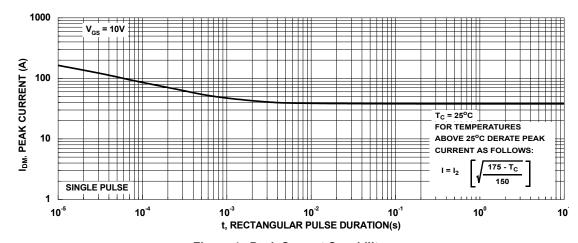


Figure 4. Peak Current Capability

Typical Characteristics

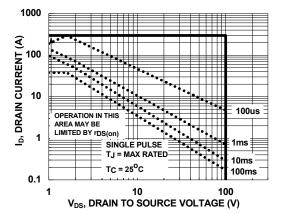
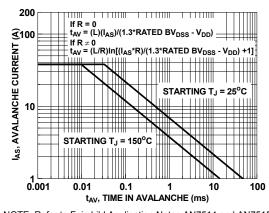


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

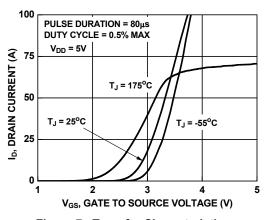


Figure 7. Transfer Characteristics

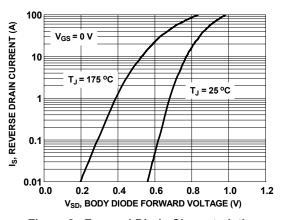


Figure 8. Forward Diode Characteristics

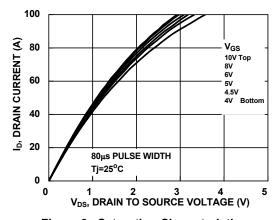


Figure 9. Saturation Characteristics

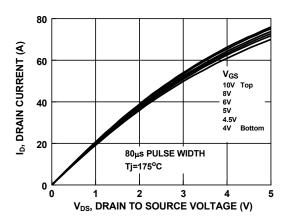


Figure 10. Saturation Characteristics

Typical Characteristics

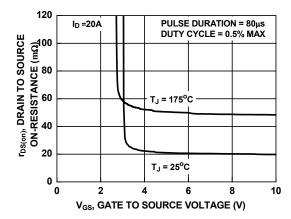


Figure 11. Rdson vs Gate Voltage

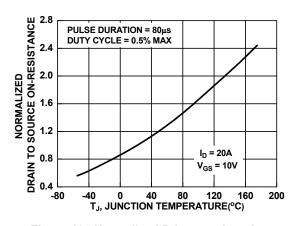


Figure 12. Normalized Rdson vs Junction Temperature

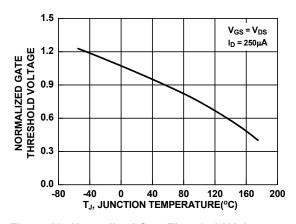


Figure 13. Normalized Gate Threshold Voltage vs Temperature

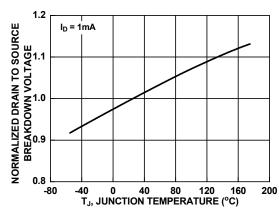


Figure 14. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

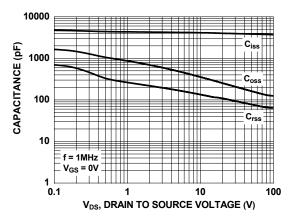


Figure 15. Capacitance vs Drain to Source Voltage

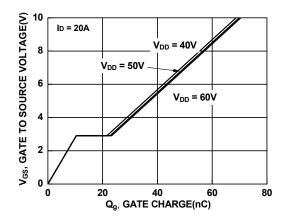


Figure 16. Gate Charge vs Gate to Source Voltage





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