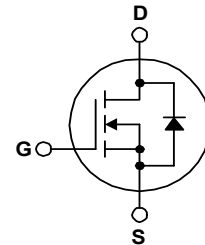


### Description

This N-Channel MOSFET is has been tailored to mini-mize the on-state resistance while maintaining superior switching performance.

### Features

- Fast Switching Speed
- Low Gate Charge,  $Q_G = 89$  nC (Typ.)
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- $V_{DS}(V) = 100V$
- $I_D = 75A$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 3.6m\Omega$  ( $V_{GS} = 10V$ )



### Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter

### MOSFET Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted.

Symbol	Parameter	FDP036N10A	Unit
$V_{DSS}$	Drain to Source Voltage	100	V
$V_{GSS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current	- Continuous ( $T_C = 25^\circ C$ , Silicon Limited)	214*
		- Continuous ( $T_C = 100^\circ C$ , Silicon Limited)	151*
		- Continuous ( $T_C = 25^\circ C$ , Package Limited)	120
$I_{DM}$	Drain Current	- Pulsed (Note 1)	856
$E_{AS}$	Single Pulsed Avalanche Energy	(Note 2)	658
$dv/dt$	Peak Diode Recovery $dv/dt$	(Note 3)	6.0
$P_D$	Power Dissipation	( $T_C = 25^\circ C$ )	333
		- Derate Above $25^\circ C$	2.22
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	$^\circ C$

\*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

### Thermal Characteristics

Symbol	Parameter	FDP036N10A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.45	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

### Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}, T_C = 25^\circ\text{C}$	100			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$ , Referenced to $25^\circ\text{C}$		0.03		V/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 80 \text{ V}, T_C = 150^\circ\text{C}$			500	
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.0	3.0	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 75 \text{ A}$		3.2	3.6	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10 \text{ V}, I_D = 75 \text{ A}$		167		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		5485	7295	pF
$C_{oss}$	Output Capacitance			2430	3230	pF
$C_{rss}$	Reverse Transfer Capacitance			210	315	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 80 \text{ V}, I_D = 75 \text{ A}, V_{GS} = 10 \text{ V}$		89	116	nC
$Q_{gs}$	Gate to Source Gate Charge			24		nC
$Q_{gs2}$	Gate Charge Threshold to Plateau			8		nC
$Q_{gd}$	Gate to Drain "Miller" Charge		(Note 4)	25		nC
ESR	Equivalent Series Resistance (G-S)	$f = 1 \text{ MHz}$		1.2		$\Omega$
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50 \text{ V}, I_D = 75 \text{ A}, V_{GS} = 10 \text{ V}, R_G = 4.7 \Omega$		22	54	ns
$t_r$	Turn-On Rise Time			54	118	ns
$t_{d(off)}$	Turn-Off Delay Time			37	84	ns
$t_f$	Turn-Off Fall Time		(Note 4)	11	32	ns
$I_S$	Maximum Continuous Drain to Source Diode Forward Current				214	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current				856	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{SD} = 75 \text{ A}$			1.25	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0 \text{ V}, I_{SD} = 75 \text{ A}, di_F/dt = 100 \text{ A}/\mu\text{s}$		72	93.6	ns
$Q_{rr}$	Reverse Recovery Charge			129		nC

**Notes:**

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 1 \text{ mH}$ ,  $I_{AS} = 36.3 \text{ A}$ .
3.  $I_{SD} \leq 75 \text{ A}$ ,  $di/dt \leq 200 \text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$ .
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

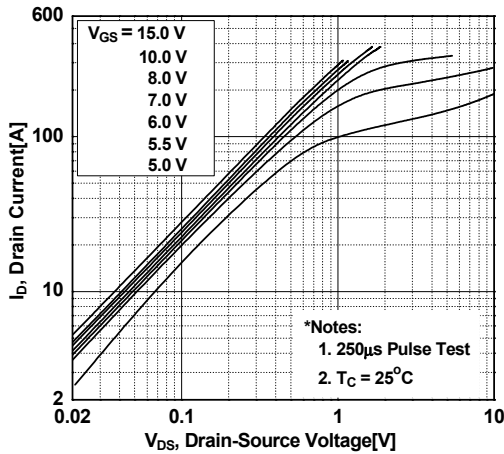


Figure 2. Transfer Characteristics

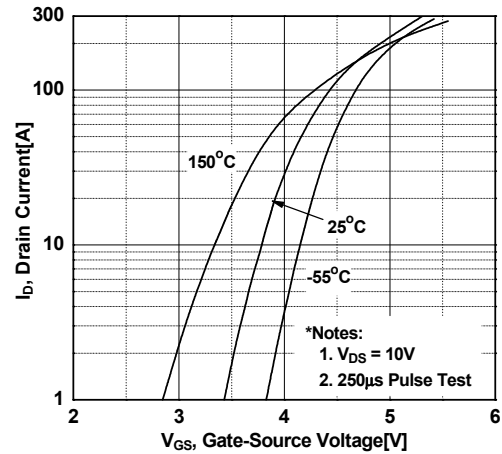


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

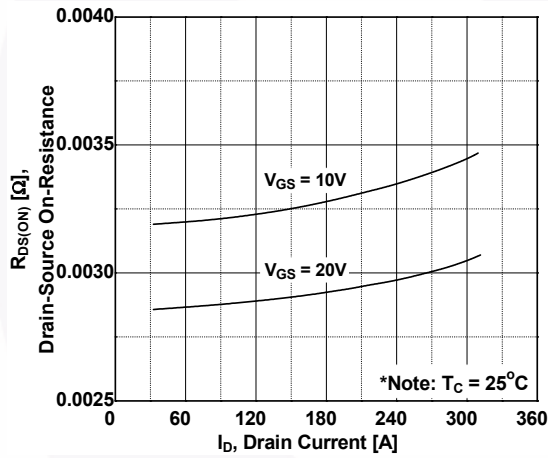


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

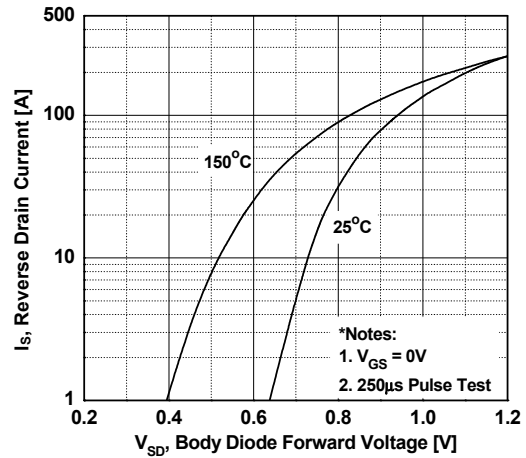


Figure 5. Capacitance Characteristics

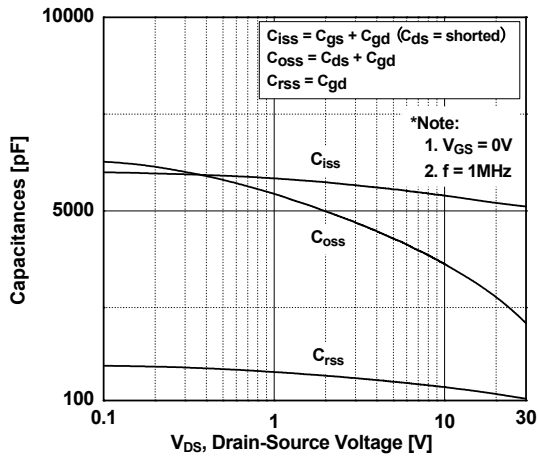
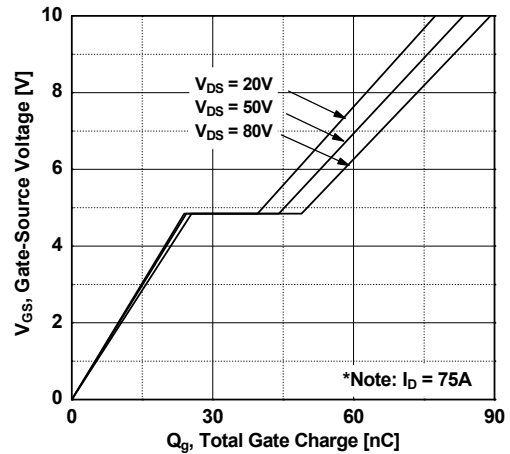


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

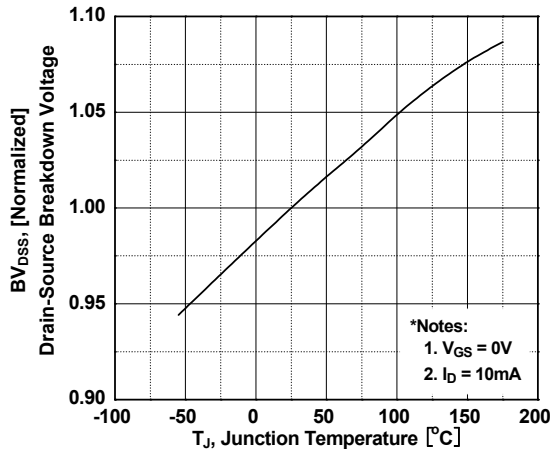


Figure 8. On-Resistance Variation vs. Temperature

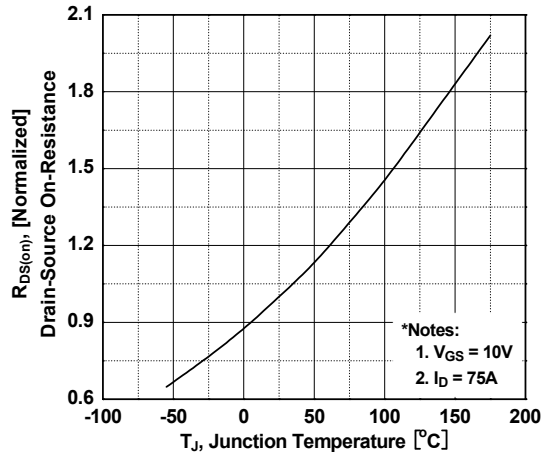


Figure 9. Maximum Safe Operating Area

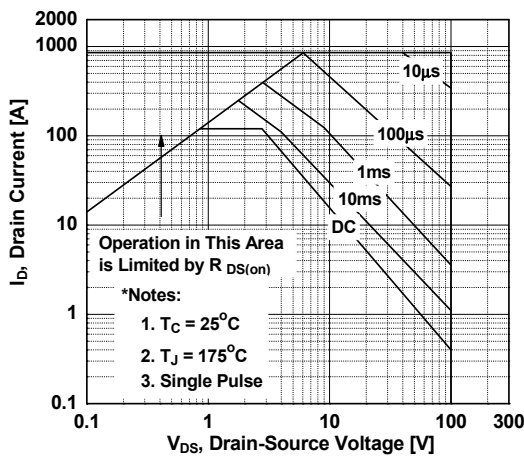


Figure 10. Maximum Drain Current vs. Case Temperature

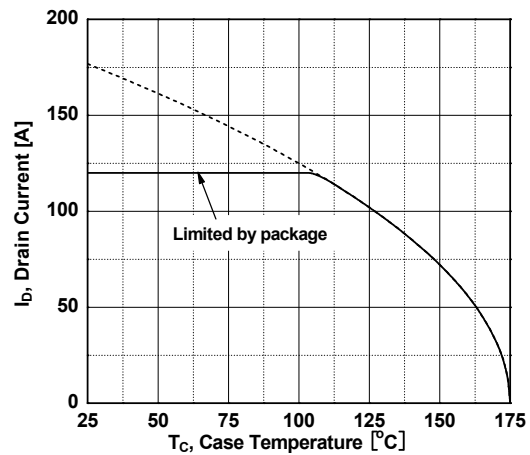
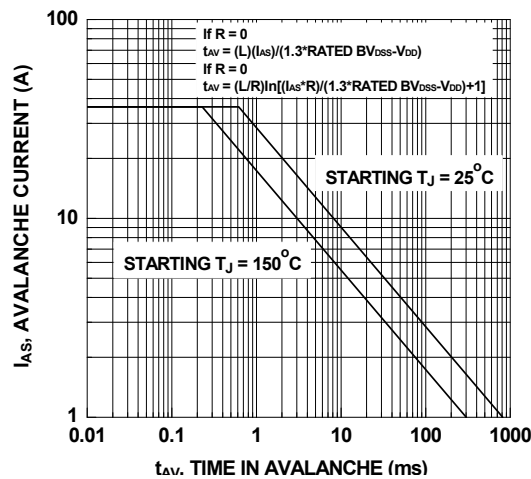
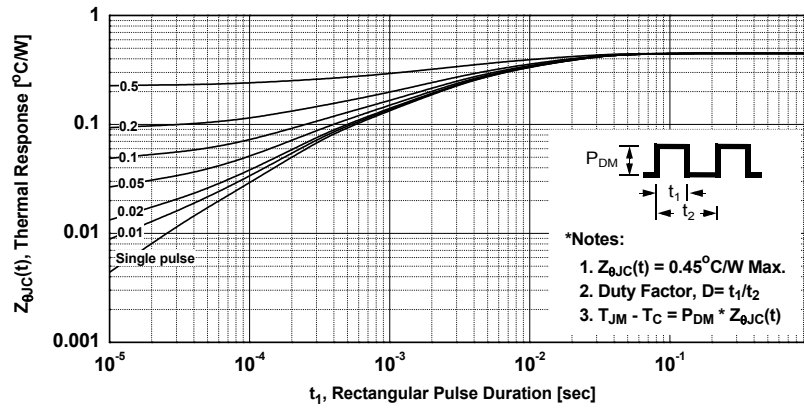


Figure 11. Unclamped Inductive Switching Capability



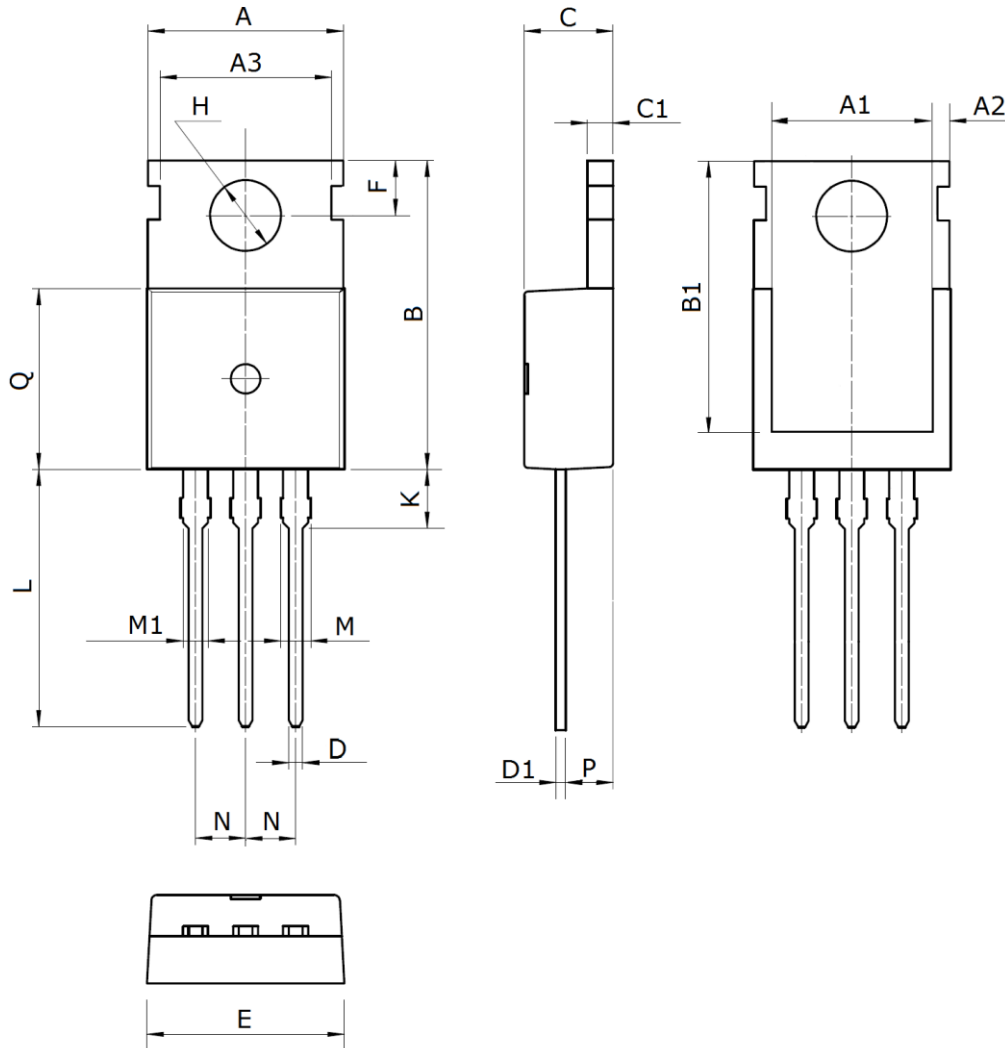
Typical Performance Characteristics

Figure 12. Transient Thermal Response Curve



Package Dimensions

TO 220



Symbol	Dimensions (mm)	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	10.0±0.3	C1	1.3±0.2	L	13.2±0.4
A1	8.0±0.2	D	0.8±0.2	M	1.38±0.1
A2	0.94±0.1	D1	0.5±0.1	M1	1.28±0.1
A3	8.7±0.1	E	10.0±0.3	N	2.54(typ)
B	15.6±0.4	F	<b>2.8±0.1</b>	P	2.4±0.3
B1	<b>13.2±0.2</b>	H	3.6±0.1	Q	<b>9.15±0.25</b>
C	<b>4.5±0.2</b>	K	3.1±0.2		

**Marking**



**Ordering information**

Order code	Package	Baseqty	Deliverymode
UMW FDP036N10A	TO-220	1000	Tube and box

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