

# MDD45P03Q

## 30V P-Channel Enhancement Mode MOSFET

### 1. Description

This P-Channel MOSFET is produced using MDD's advanced Power Trench technology. This process has been optimized to minimize on-state resistance and yet maintain superior switching performance with best in class soft body diode.

### 2. Features

- Max  $R_{DS(on)}$  = 12m $\Omega$  at  $V_{GS} = -10$  V,  $I_D = -10$  A
- Extremely Low Reverse Recovery Charge,  $Q_g$
- 100% UIS Tested
- 100% dVDS Tested

### 3. Application

- Power Management in Telecom., Industrial Automation
- Motor Drives and Uninterruptible Power Supplies
- Current Switching in DC/DC&AC/DC(SR) Sub-systems

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Note 1)	$I_D$	-45	A
Single Pulsed Avalanche Energy (Note 3)	$E_{AS}$	51.8	mJ
Thermal Resistance, steady-state	$R_{\theta JA}$	65	$^\circ\text{C}/\text{W}$
Power Dissipation	$P_D$	46	W
Junction Temperature	$T_J$	-55~+150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55~+150	$^\circ\text{C}$

Note: 1) Calculated continuous current based on maximum allowable junction temperature.  
2) Repetitive rating, pulse width limited by max. junction temperature.  
3)  $E_{AS}$  condition:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=-15\text{V}$ ,  $V_{GS}=-10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$ ,  $I_{AS}=-14.4\text{A}$ .

### 5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
4	G	Gate			MDD 45P03Q XXY: Date code	PDFN3*3-8L
5-8	D	Drain				
1-3	S	Source				

### 6. $T_A=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	—	—	V
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V$	—	—	$\pm 100$	nA
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-30V, V_{GS}=0V$	—	—	-1	$\mu A$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-10A$	—	9.5	12	m $\Omega$
		$V_{GS}=-4.5V, I_D=-5A$	—	13.5	17	m $\Omega$

### 7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-15V$ $f=1.0MHz$	—	2545	—	pF
$C_{oss}$	Output Capacitance		—	260	—	pF
$C_{rss}$	Reverse Transfer Capacitance		—	236	—	pF
$Q_g$	Total Gate Charge	$V_{GS}=-10V$ $V_{DS}=-15V$ $I_D=-20A$	—	38	—	nC
$Q_{gs}$	Gate Source Charge		—	8	—	nC
$Q_{gd}$	Gate Drain Charge		—	12	—	nC

### 8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=-10V$ $V_{DD}=-15V$ $I_D=-20A$ $R_G=2.3\Omega$	—	7	—	ns
$t_r$	Turn on Rise Time		—	6	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	105	—	ns
$t_f$	Turn Off Fall Time		—	69	—	ns

### 9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{SD}$	Drain-Source Diode Forward Voltage	$I_S=-25A, V_{GS}=0V$	—	-0.8	-1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=-20A$	—	22	—	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$di/dt=-100A/\mu s$	—	43	—	nC

### 10. Electrical Characteristics Diagrams

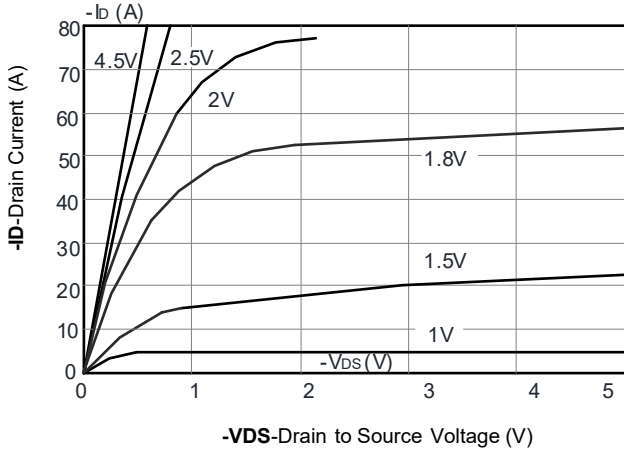


Figure 1. Typ. output characteristics

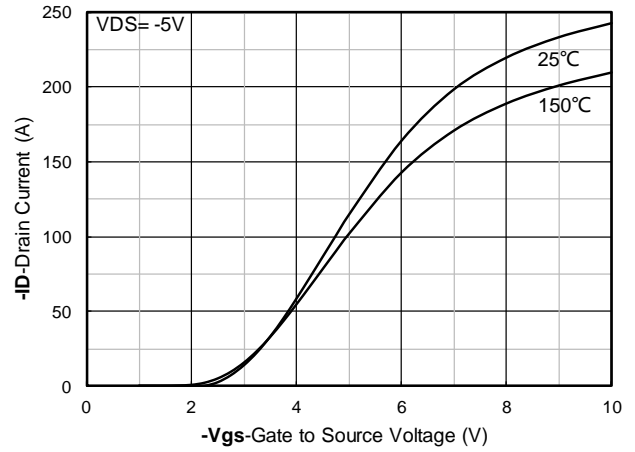


Figure 2. Typ. transfer characteristics

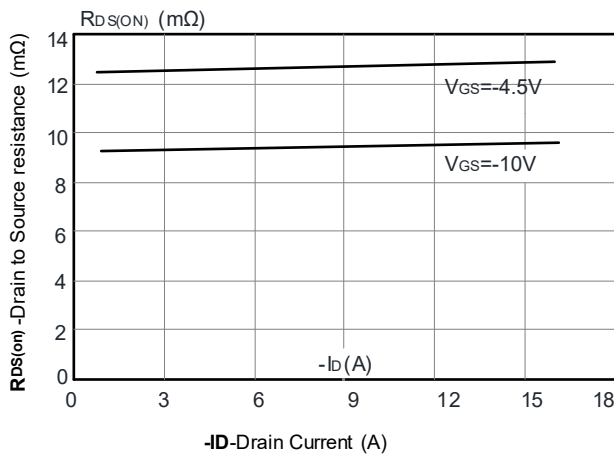


Figure 3. On-Resistance vs. Drain Current

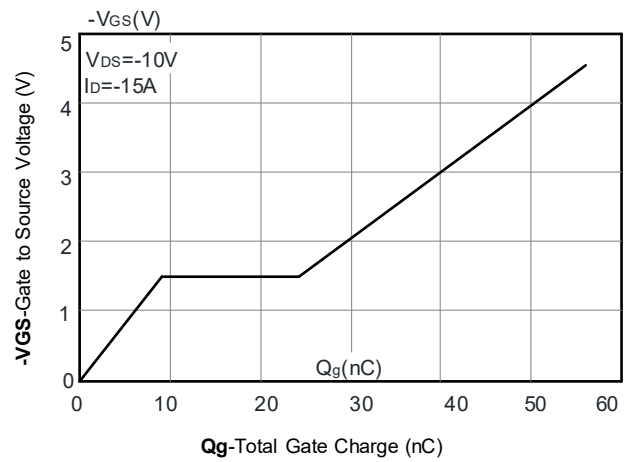


Figure 4. Gate Charge Characteristics

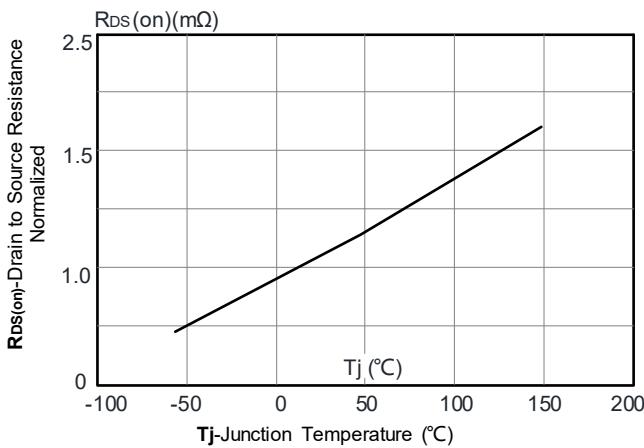


Figure 5. Normalized on Resistance vs. Junction Temperature

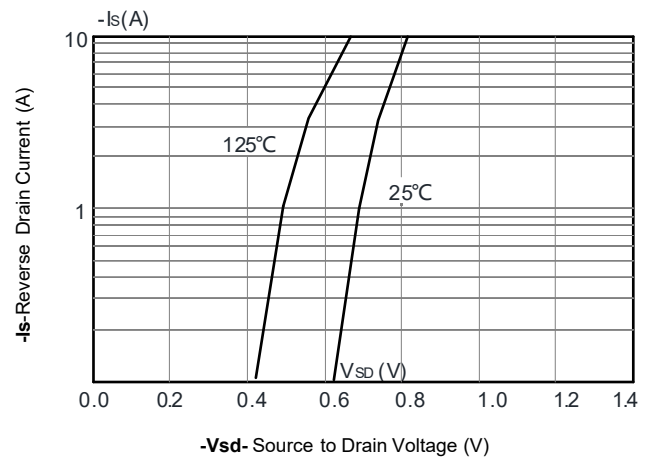
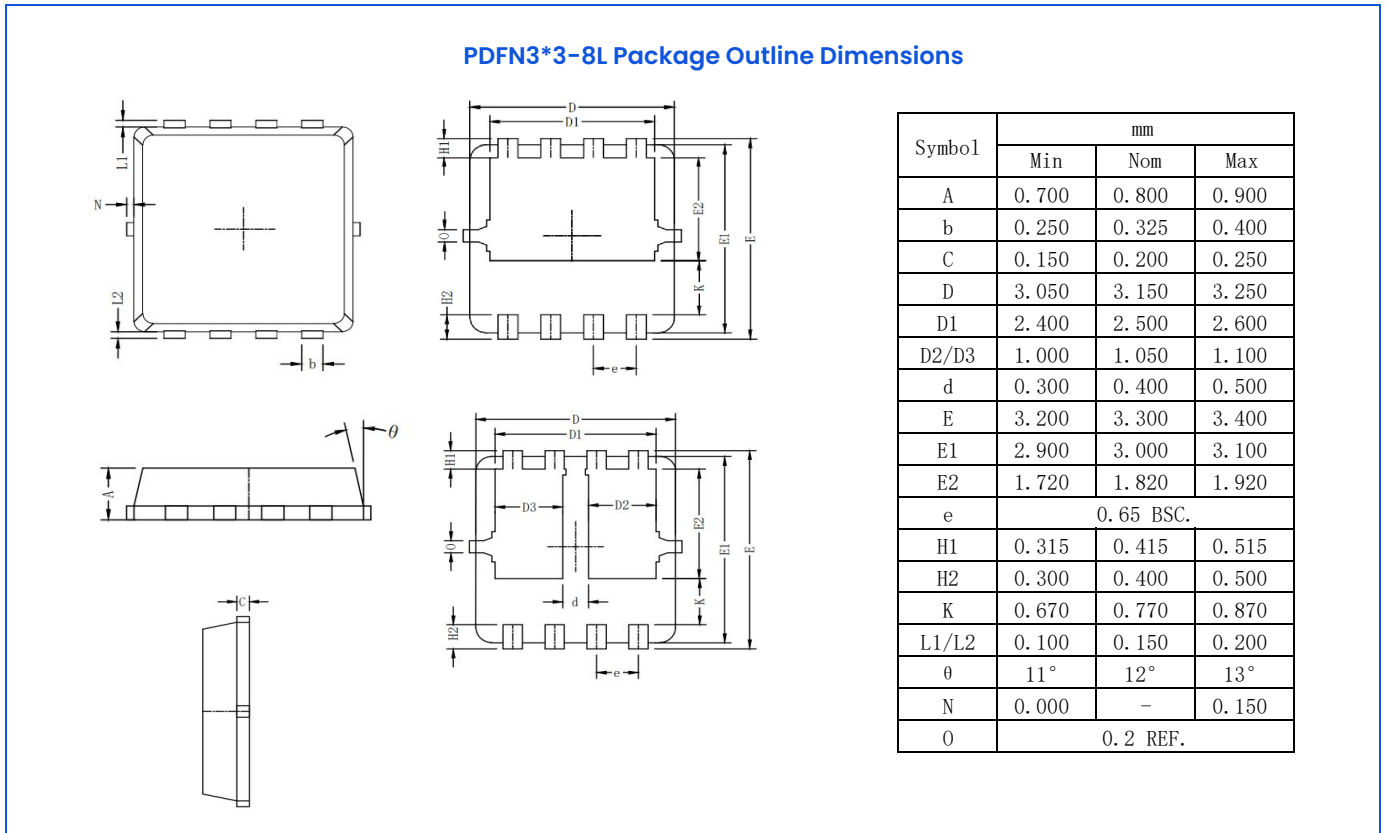


Figure 6. Forward characteristic of body diode

### 11. Outline Drawing



### 12. Important Notice and Disclaimer

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