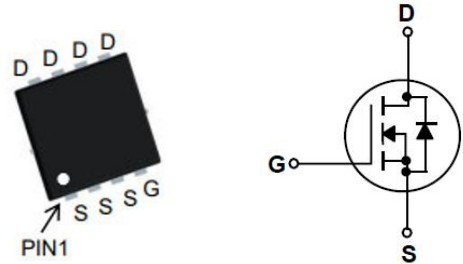


Features

- ◆ 40V, 120A, $R_{DS(ON)}(Typ.) = 2.1m\Omega @ V_{GS} = 10V$
- ◆ Advanced Shielded-Gate Technology
- ◆ Excellent $R_{DS(ON)}$ and Low Gate Charge
- ◆ 100% EAS Guaranteed

Application

- ◆ Motor Controllers
- ◆ DC-to-DC Convertors
- ◆ Battery-Driven Electronic Products, Electrical Equipment and Machines



Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	40	V
V_{GS}	Gate-Source Voltage	± 20	
I_D	Drain Current-Continuous	$T_C = 25^\circ C$	A
		$T_C = 100^\circ C$	
I_{DM}	Drain Current-Pulsed ^b	480	
P_D	Maximum Power Dissipation @ $T_J = 25^\circ C$	72.7	W
E_{AS}	Single Pulsed Avalanche Energy ^c	225	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.72	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	45	

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

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.1	1.5	2.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 20A$	-	2.1	2.6	mΩ
		$V_{GS} = 4.5V, I_D = 20A$	-	2.8	3.6	

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 20V,$ $V_{GS} = 0V,$ $f = 1MHz$	-	2800	-	pF
C_{oss}	Output Capacitance		-	1070	-	
C_{rss}	Reverse Transfer Capacitance		-	110	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 20V,$ $V_{GS} = 10V,$ $I_D = 20A,$ $R_G = 3\Omega$	-	4	-	ns
t_r	Turn-On Rise Time		-	5	-	
$t_{d(off)}$	Turn-Off Delay Time		-	35	-	
t_f	Turn-Off Fall Time		-	11	-	
Q_g	Total Gate Charge	$V_{DS} = 20V,$ $V_{GS} = 10V,$ $I_D = 20A$	-	46	-	nC
Q_{gs}	Gate-Source Charge		-	8.7	-	
Q_{gd}	Gate-Drain Charge		-	5.4	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_G = V_D = 0V,$ Force Current			120	A
I_{SM}	Maximum Pulsed Current				480	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 50A$	-	0.83	-	V
T_{rr}	Body Diode Reverse Recovery Time	$I_S = 20A,$ $di/dt = 100A/\mu s$	-	43	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_S = 20A,$ $di/dt = 100A/\mu s$	-	53	-	nC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating; pulse width limited by maximum junction temperature.
- $L = 0.5mH, V_{DD} = 25V, I_{AS} = 30A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

■ Characteristic Curve

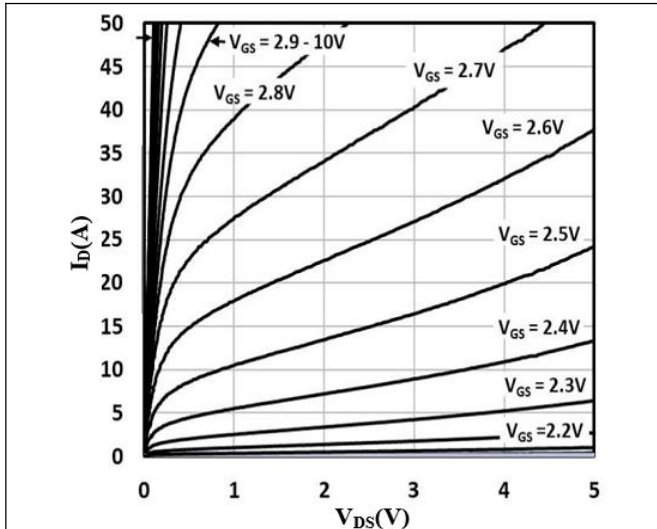


Figure 1. Typical Output Characteristics

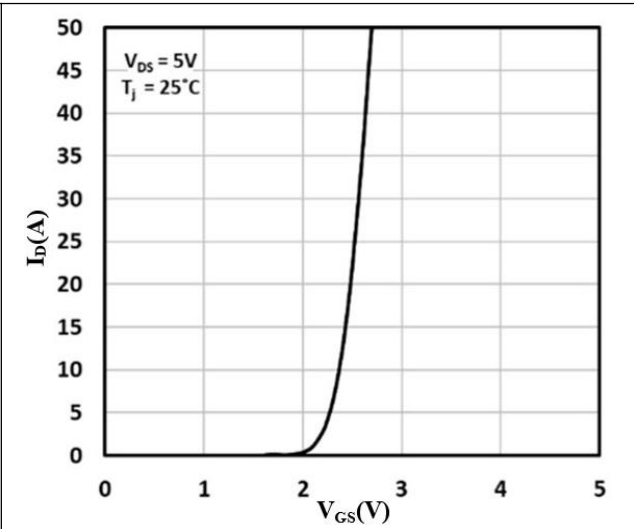


Figure 2. Typical Transfer Characteristics

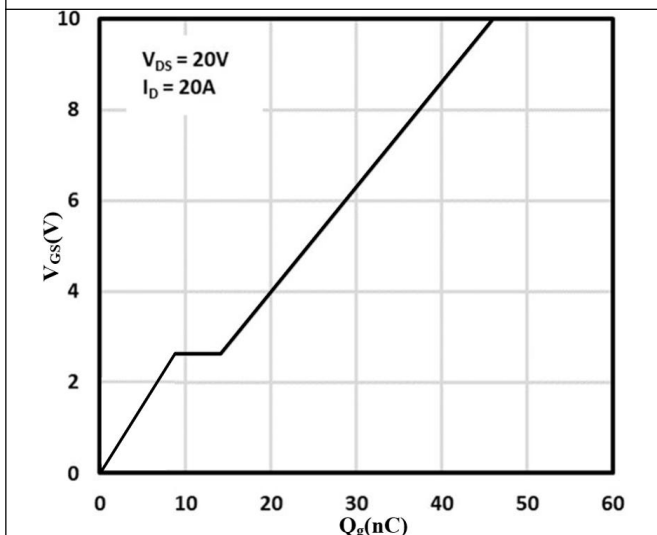


Figure 3. Typical Gate Charge

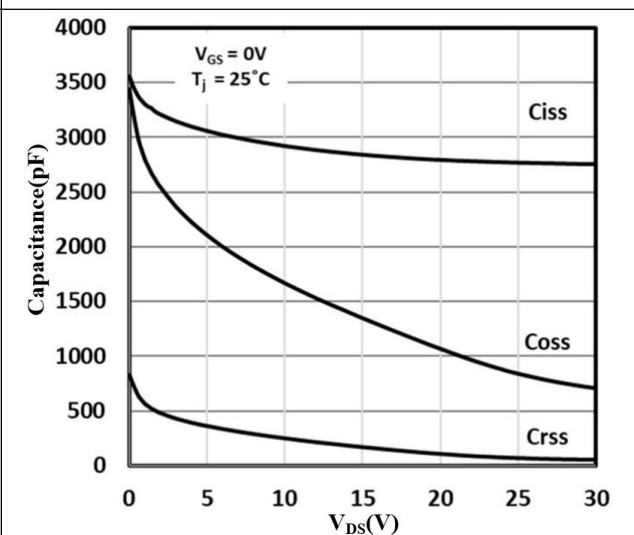


Figure 4. Typical Capacitance

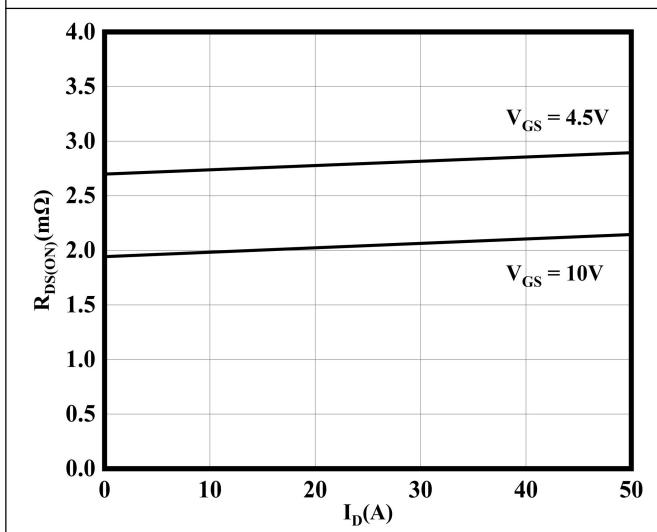


Figure 5. On-Resistance vs Drain Current

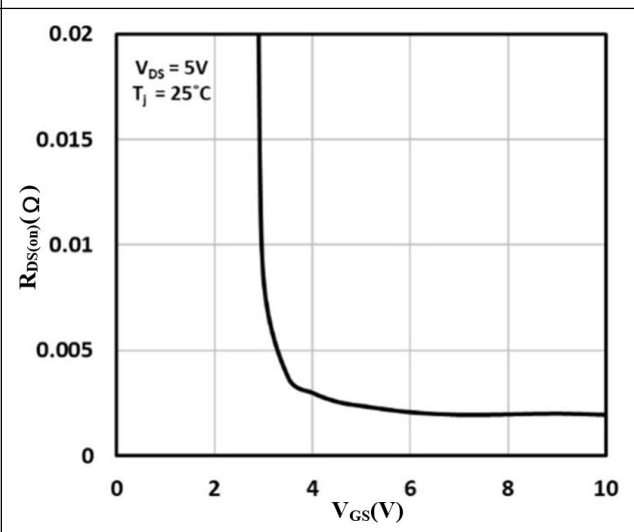


Figure 6. On-Resistance vs Gate Voltage

■ Characteristic Curve

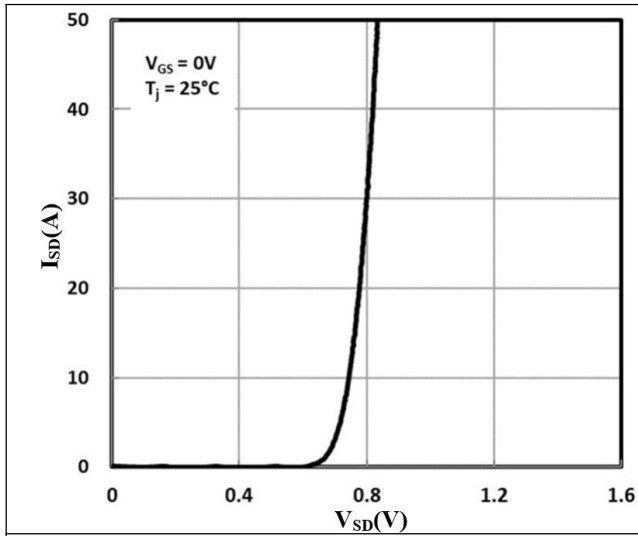


Figure 7. Source-to-Drain Diode Forward Characteristics

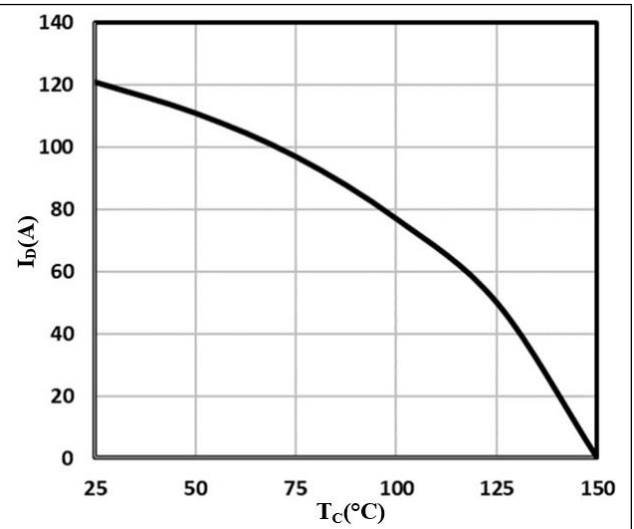


Figure 8. Maximum Continuous Drain Current vs Case Temperature

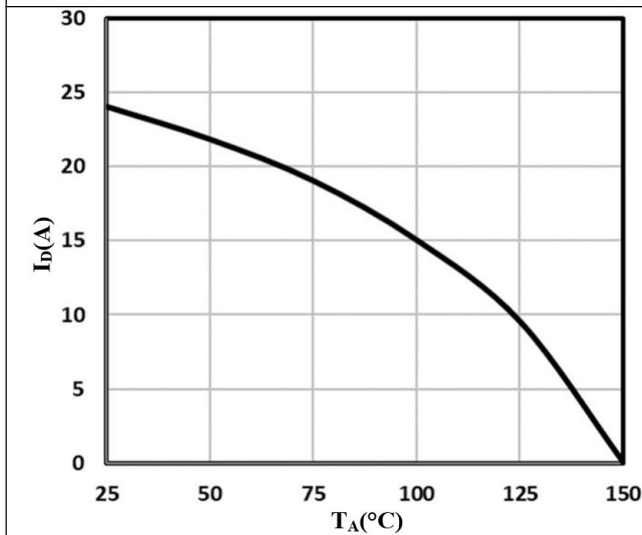
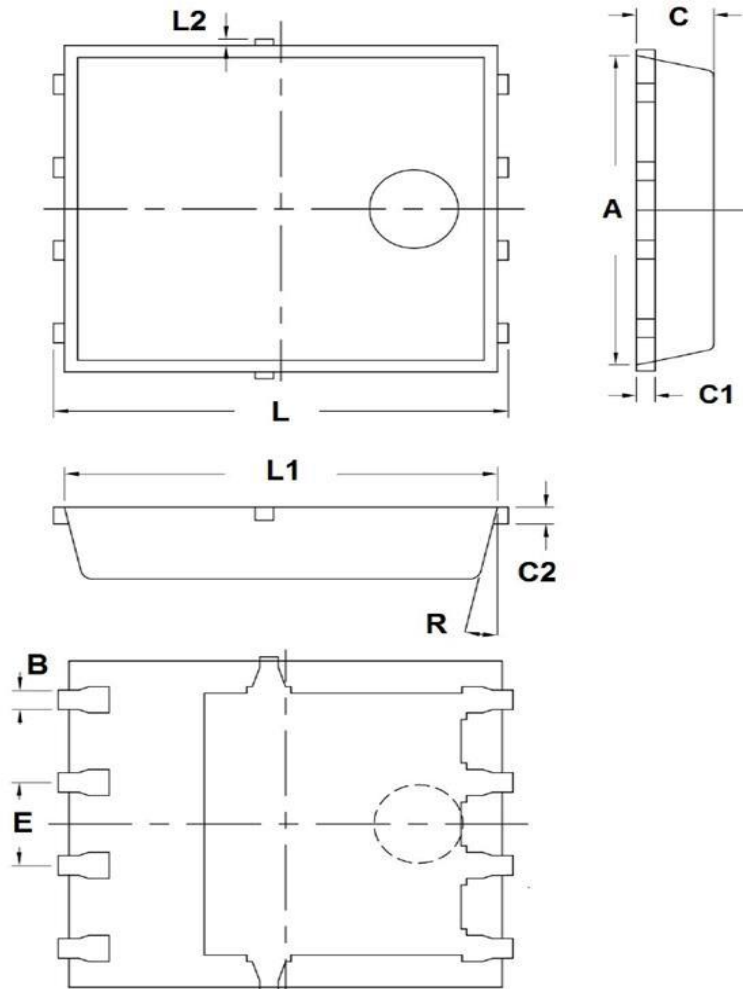


Figure 9. Maximum Continuous Drain Current vs Ambient Temperature

■ Package Information

PDFN5×6



Dim.	Min.	Max.
A	4.8	5.2
B	0.25	0.35
C	1.0	1.2
C1	Typ 0.254	
C2	Typ 0.254	
E	Typ 1.27	
L	6.0	6.3
L1	5.7	6.0
L2	MAX 0.2	
R	Typ 13°	