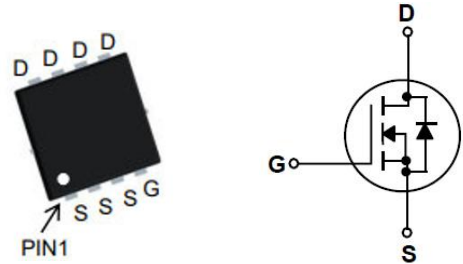


Features

- ◆ 40V, 190A, $R_{DS(on)}$ (Typ.) = $2.6m\Omega @ V_{GS} = 10V$
- ◆ Excellent $R_{DS(on)}$ and Low Gate Charge
- ◆ Halogen-free; RoHS-compliant
- ◆ 100% E_{AS} Guaranteed

Application

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



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

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	40	V
V_{GS}	Gate-Source Voltage	± 25	
I_D	Drain Current-Continuous	$T_c = 25^\circ\text{C}$	A
		$T_c = 100^\circ\text{C}$	
I_{DM}	Drain Current-Pulsed ^b	570	
P_D	Maximum Power Dissipation, $T_c = 25^\circ\text{C}$	113	W
E_{AS}	Single Pulsed Avalanche Energy ^c	473	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	37	

Electrical Characteristics $T_J = 25^\circ\text{C}$ 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	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1.0	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 25V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 20A$	-	2.6	3.2	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	$V_{DS} = V_{GS} = 0V, f = 1.0MHz$	-	1.6	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz$	-	9523	-	pF
C_{oss}	Output Capacitance		-	978	-	
C_{rss}	Reverse Transfer Capacitance		-	578	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 20V, V_{GS} = 10V, I_D = 30A, R_G = 3.0\Omega$	-	14	-	ns
t_r	Turn-On Rise Time		-	28	-	
$t_{d(off)}$	Turn-Off Delay Time		-	77	-	
t_f	Turn-Off Fall Time		-	23	-	
Q_g	Total Gate Charge	$V_{DS} = 20V, V_{GS} = 0 \text{ to } 10V, I_D = 30A$	-	147	-	nC
Q_{gs}	Gate-Source Charge		-	50	-	
Q_{gd}	Gate-Drain Charge		-	31	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_G = V_D = 0V, \text{ Force Current}$	-	-	190	A
I_{SM}	Maximum Pulsed Current		-	-	570	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 50A$	-	-	1.2	V
T_{rr}	Body Diode Reverse Recovery Time	$I_F = 30A, di_F/dt = 100A/\mu s$	-	25	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 30A, di_F/dt = 100A/\mu s$	-	16.3	-	nC

Notes:

- $T_J = +25^\circ C \text{ to } +150^\circ C$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $L = 0.5mH, V_{DD} = 25V, I_{AS} = 43A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

Characteristic Curve

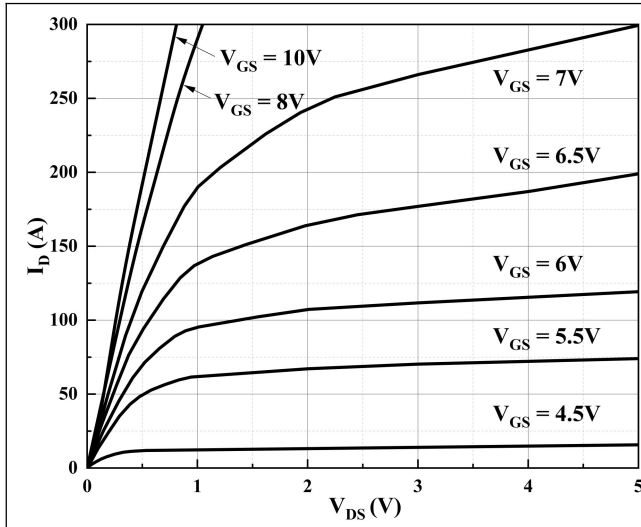


Figure 1. Typical Output Characteristics

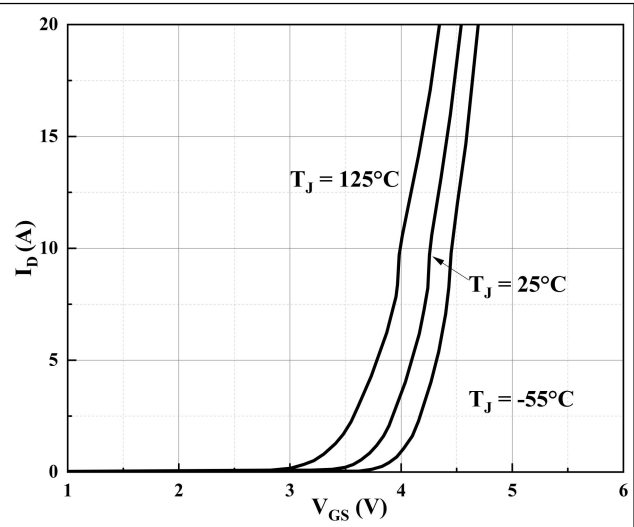


Figure 2. Typical Transfer Characteristics

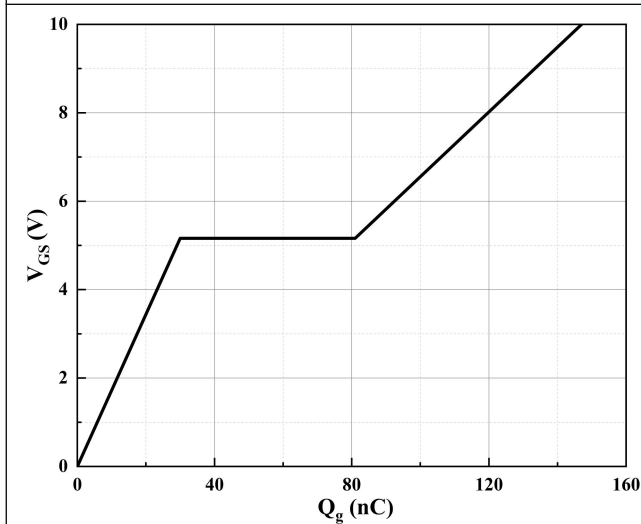


Figure 3. Typical Gate Charge

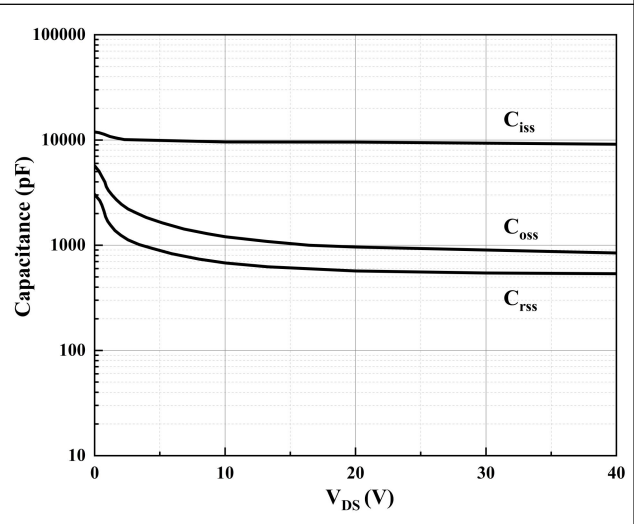


Figure 4. Typical Capacitance

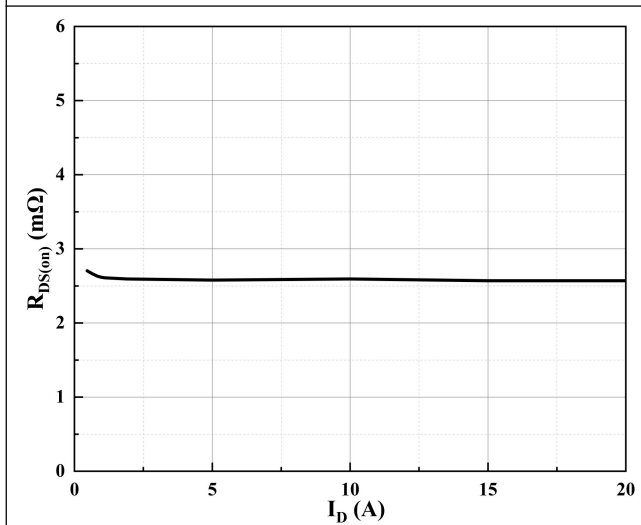


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

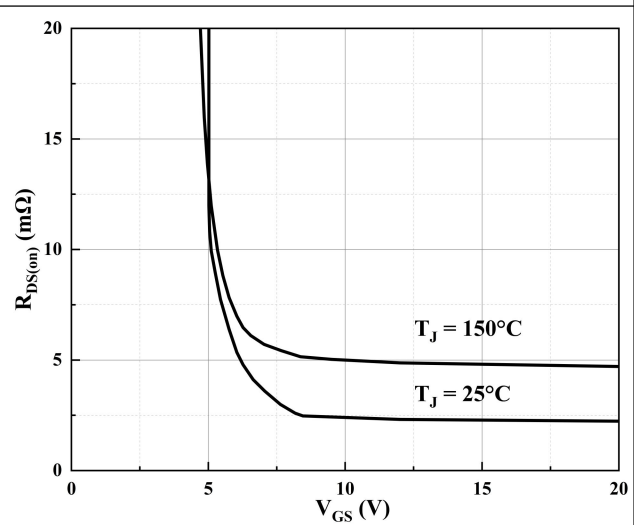


Figure 6. Static Drain-Source On-Resistance vs. Gate-Source Voltage

■ Characteristic Curve

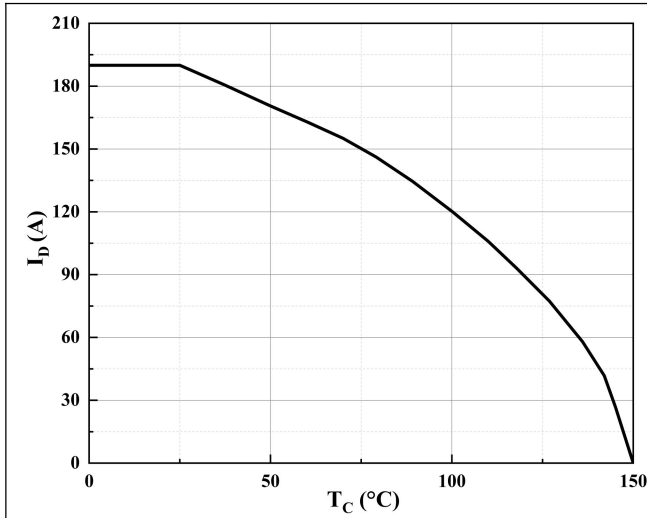


Figure 7. Maximum Continuous Drain Current vs. Case Temperature

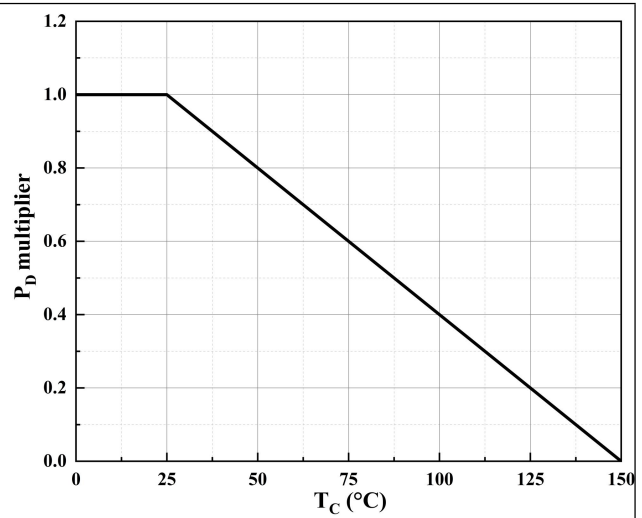


Figure 8. Maximum Power Dissipation multiplier vs. Case Temperature

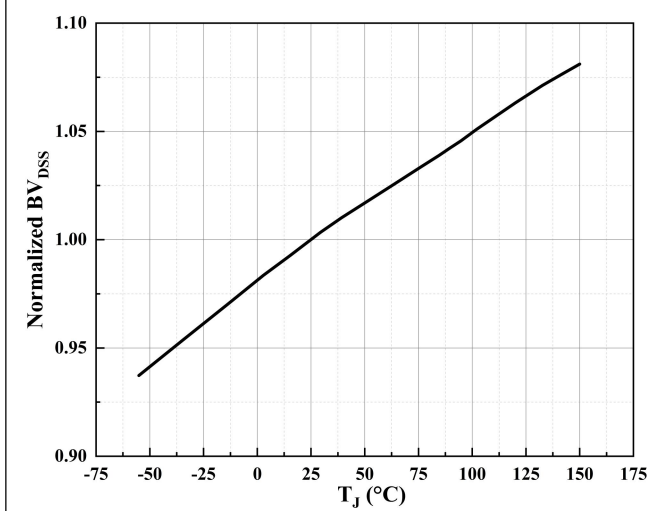


Figure 9. Normalized Drain-Source Breakdown Voltage vs. Junction Temperature

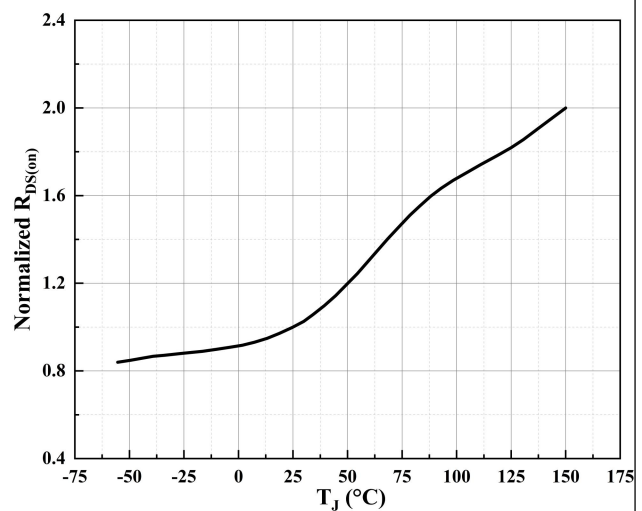


Figure 10. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

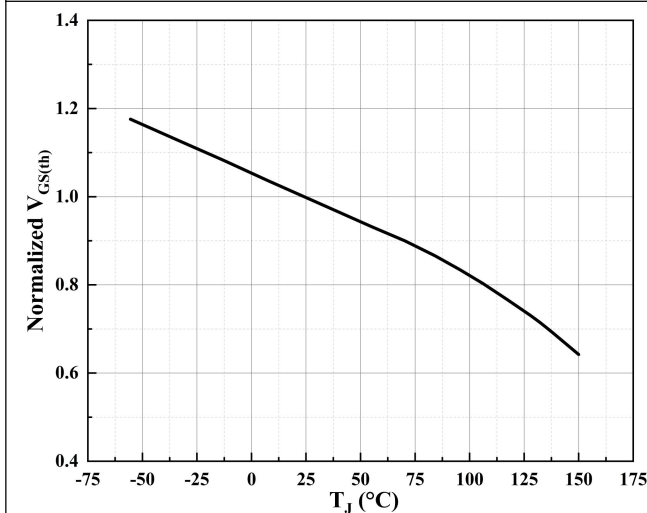


Figure 11. Normalized Gate Threshold Voltage vs. Junction Temperature

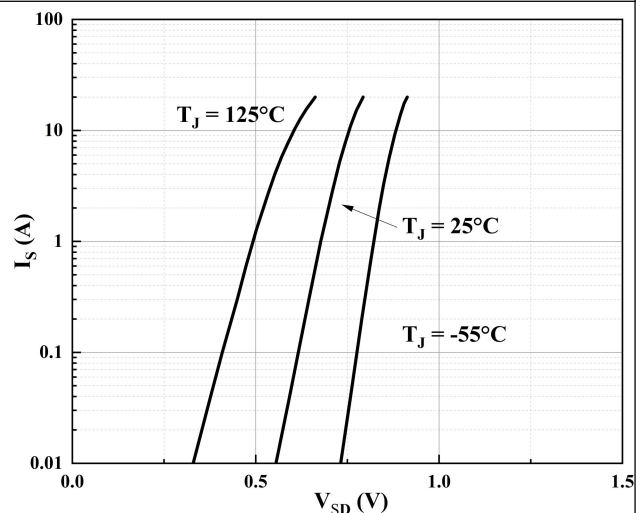
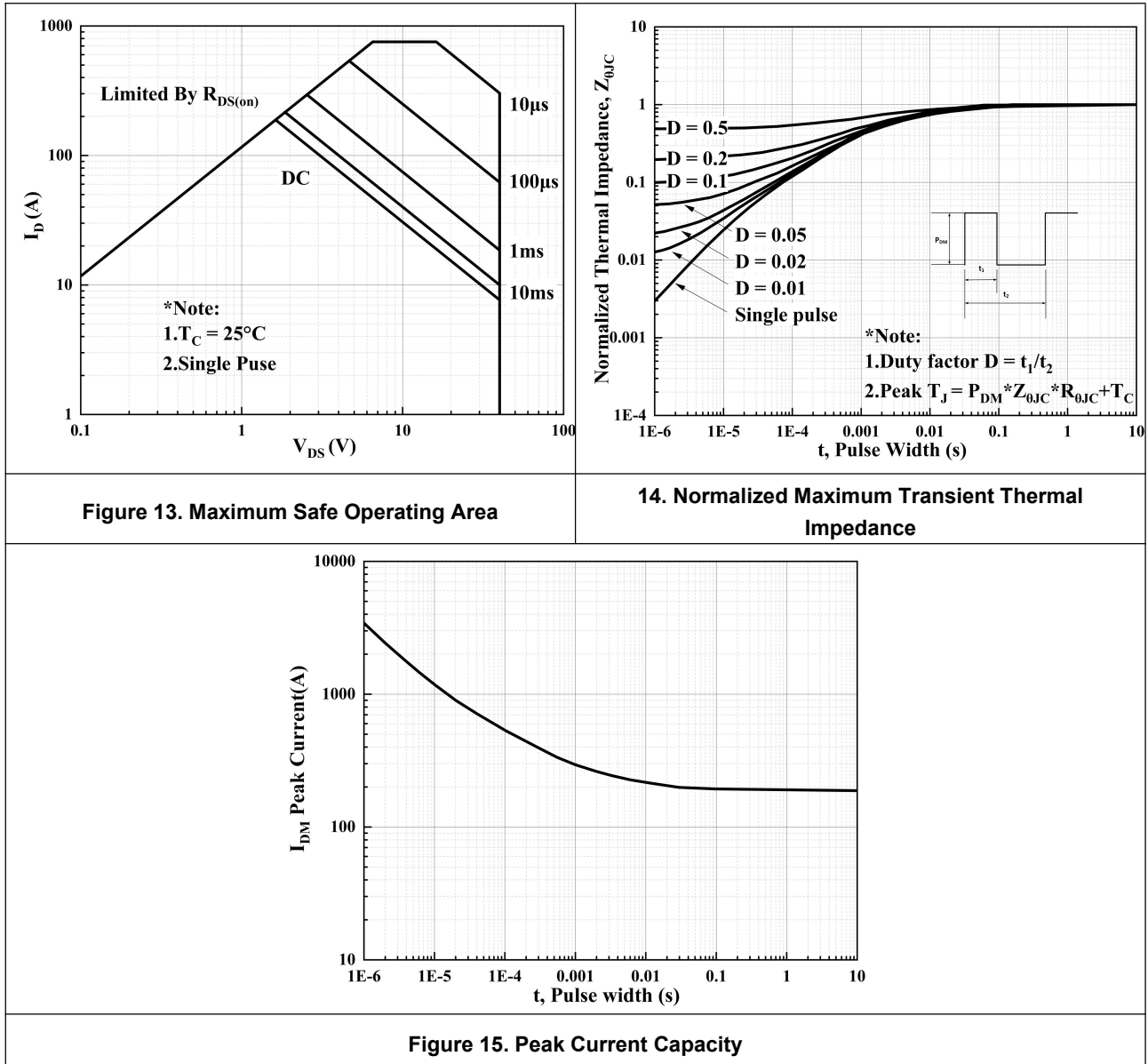


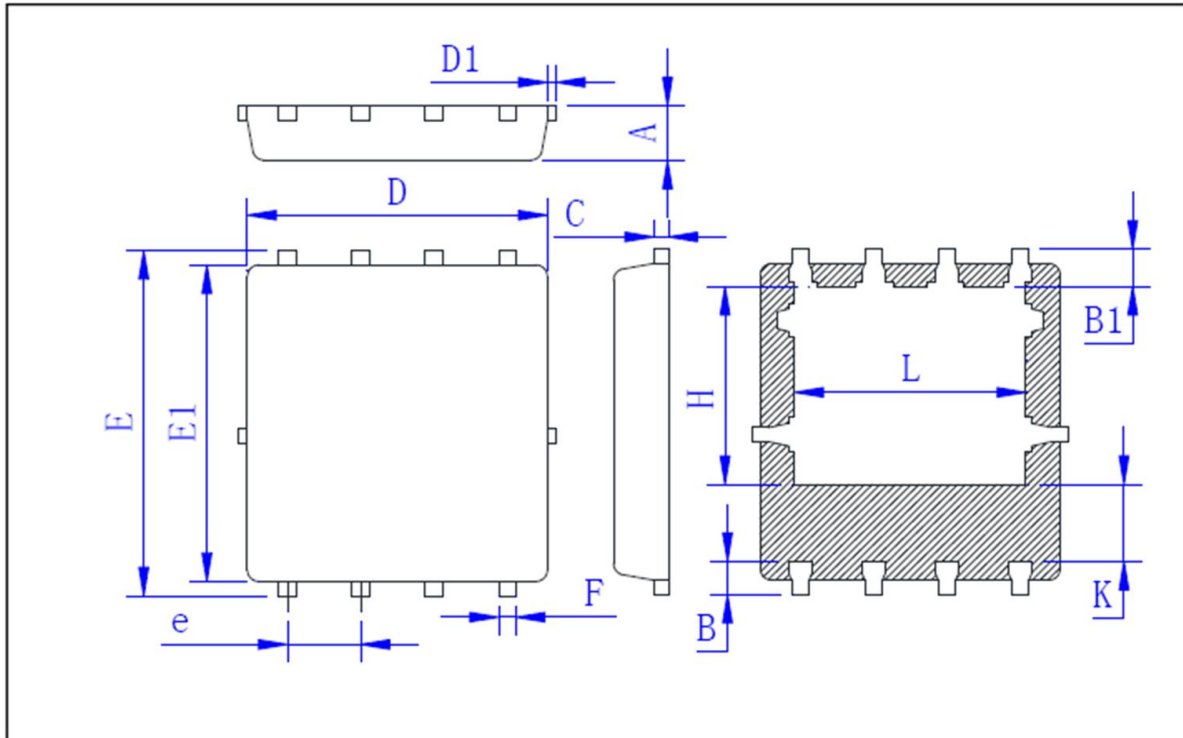
Figure 12. Body Diode Characteristics

■ Characteristic Curve



■ Package Information

PDFN5*6



Symbol	Min	Typ	Max
A	0.90	0.95	1.00
B	0.48	0.58	0.68
B1	0.55	0.65	0.75
C	0.20	0.254	0.30
D	5.10	5.20	5.30
D1			0.15
E	5.90	6.05	6.20
E1	5.40	5.55	5.70
e	1.22	1.27	1.32
F	0.25	0.30	0.35
H	3.27	3.47	3.67
L	3.80	4.00	4.20
K	1.20		