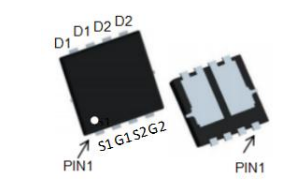
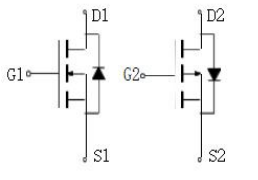


Features

- ◆ NMOS 30V, 20A
 $R_{DS(ON)} = 11m\Omega(Typ.) @ V_{GS} = 10V$
 $R_{DS(ON)} = 16m\Omega(Typ.) @ V_{GS} = 4.5V$
- ◆ PMOS -30V, -22A
 $R_{DS(ON)} = 15m\Omega(Typ.) @ V_{GS} = -10V$
 $R_{DS(ON)} = 19m\Omega(Typ.) @ V_{GS} = -4.5V$
- ◆ Reliable and Rugged
- ◆ 100% EAS Guaranteed

PDFN-3x3 (view)	Symbol
	

Application

- ◆ Motor Drive Applications

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

Symbol	Parameter	Max.N-MOS	Max.P-MOS	Unit
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	
I_D	Drain Current-Continuous, $T_C = 25^\circ C$	20	-22	A
	Drain Current-Continuous, $T_C = 100^\circ C$	13	-14	
	Drain Current-Continuous, $T_A = 25^\circ C$	9	-8	
	Drain Current-Continuous, $T_A = 70^\circ C$	7	-6	
I_{DM}	Drain Current-Pulsed ^a	80	-88	
E_{AS}	Avalanche Energy, Single pulse ^b	16	20	mJ
I_{AS}	Avalanche Current	8	-9	A
P_D	Total Power Dissipation @ $T_C = 25^\circ C$	16	24	W
	Total Power Dissipation @ $T_C = 100^\circ C$	6.5	9.5	
	Total Power Dissipation @ $T_A = 25^\circ C$	2.8	2.8	
	Total Power Dissipation @ $T_A = 70^\circ C$	1.8	1.8	
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to 150		$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.N-MOS	Max.P-MOS	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case	7.8	5.2	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ^c	45	45	$^\circ C/W$
$R_{\theta JT}$	Thermal Resistance Junction-Top of package ^c	NA	NA	$^\circ C/W$

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	$V_{GS} = 0V, I_D = 250\mu A$	N	30	-	-	V
		$V_{GS} = 0V, I_D = -250\mu A$	P	-30	-	-	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$ $T_J = 125^\circ C$	N	-	-	1	μA
				-	-	30	
		$V_{DS} = -30V, V_{GS} = 0V$ $T_J = 125^\circ C$	P	-	-	1	
				-	-	30	
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	N	-	-	± 100	nA
		$V_{DS} = 0V, V_{GS} = \pm 20V$	P	-	-	± 100	

■ On Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	N	1.0	1.7	2.5	V
		$V_{DS} = V_{GS}, I_D = -250\mu A$	P	-1.0	-1.6	-2.5	
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 8A$	N	-	11	15	m Ω
		$V_{GS} = -10V, I_D = -8A$	P	-	15	21	
		$V_{GS} = 4.5V, I_D = 6A$	N	-	16	23	
		$V_{GS} = -4.5V, I_D = -6A$	P	-	19	28	

■ Dynamic Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
R _g	Gate Resistance	V _{GS} = 0V, V _{DS} = 0V f = 1.0MHz	N	-	NA	-	Ω
			P	-	NA	-	
C _{iss}	Input Capacitance	N-MOS V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz P-MOS V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	N	-	853	-	pF
C _{oss}	Output Capacitance		P	-	1267	-	
			N	-	106	-	
			P	-	166	-	
			C _{rss}	Reverse Transfer Capacitance	N	-	
P	-				126	-	

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	N-MOS $V_{DS} = 15V, I_D = 15A,$ $R_G = 3\Omega, V_{GS} = 10V$	N	-	6	-	ns
			P	-	4	-	
t_r	Turn-On Rise Time		N	-	15	-	
			P	-	3	-	
$t_{d(off)}$	Turn-Off Delay Time	P-MOS $V_{DS} = -15V, I_D = -5A,$ $R_G = 3\Omega, V_{GS} = -10V$	N	-	17	-	
			P	-	60	-	
t_f	Turn-Off Fall Time		N	-	5	-	nC
			P	-	50	-	
Q_g	Total Gate Charge	N-MOS $V_{DS} = 15V, I_D = 15A,$ $V_{GS} = 10V$	N	-	16	-	
			P	-	23	-	
Q_{gs}	Gate-Source Charge	P-MOS $V_{DS} = -15V, I_D = -5A,$ $V_{GS} = -10V$	N	-	3.6	-	
			P	-	4	-	
Q_{gd}	Gate-Drain Charge		N	-	3.4	-	
			P	-	5	-	

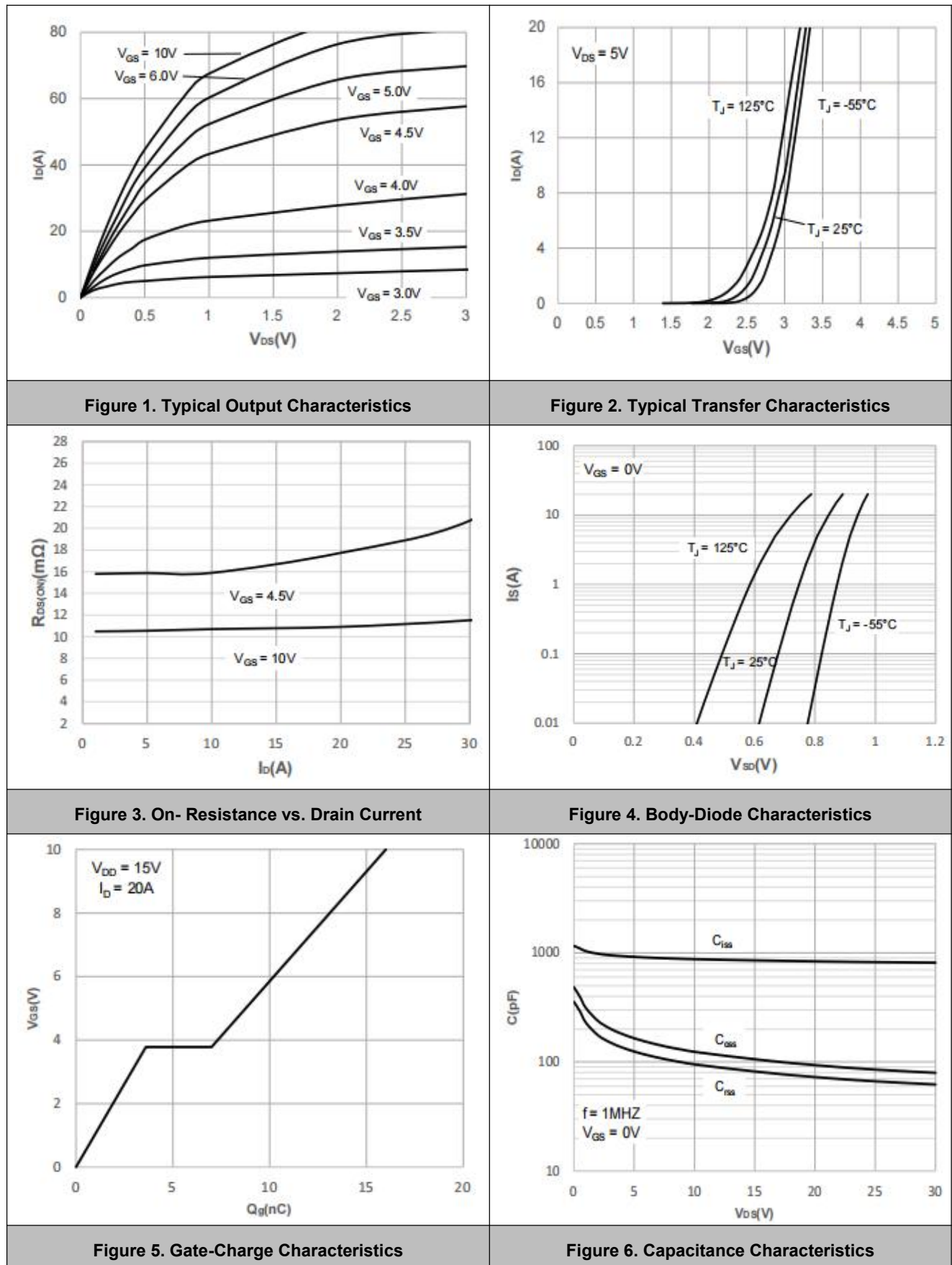
■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G = V_D = 0V,$ Force Current	N	-	-	20	A
			P	-	-	-22	
I_{SM}	Pulse Source Current		N	-	-	80	
			P	-	-	-88	
V_{SD}	Drain-Source Diode Forward Voltage ^d	$V_{GS} = 0V, I_{SD} = 1A$	N	-	0.75	1.3	V
		$V_{GS} = 0V, I_{SD} = -1A$	P	-	-0.75	-1.3	
t_{rr}	Reverse Recovery Time	N-MOS $I_F = 13A, di/dt = 100A/\mu s$	N	-	9.4	-	ns
			P	-		-	
Q_{rr}	Reverse Recovery Charge	P-MOS $I_F = -7A, di/dt = 100A/\mu s$	N	-	3.3	-	nC
			P	-		-	

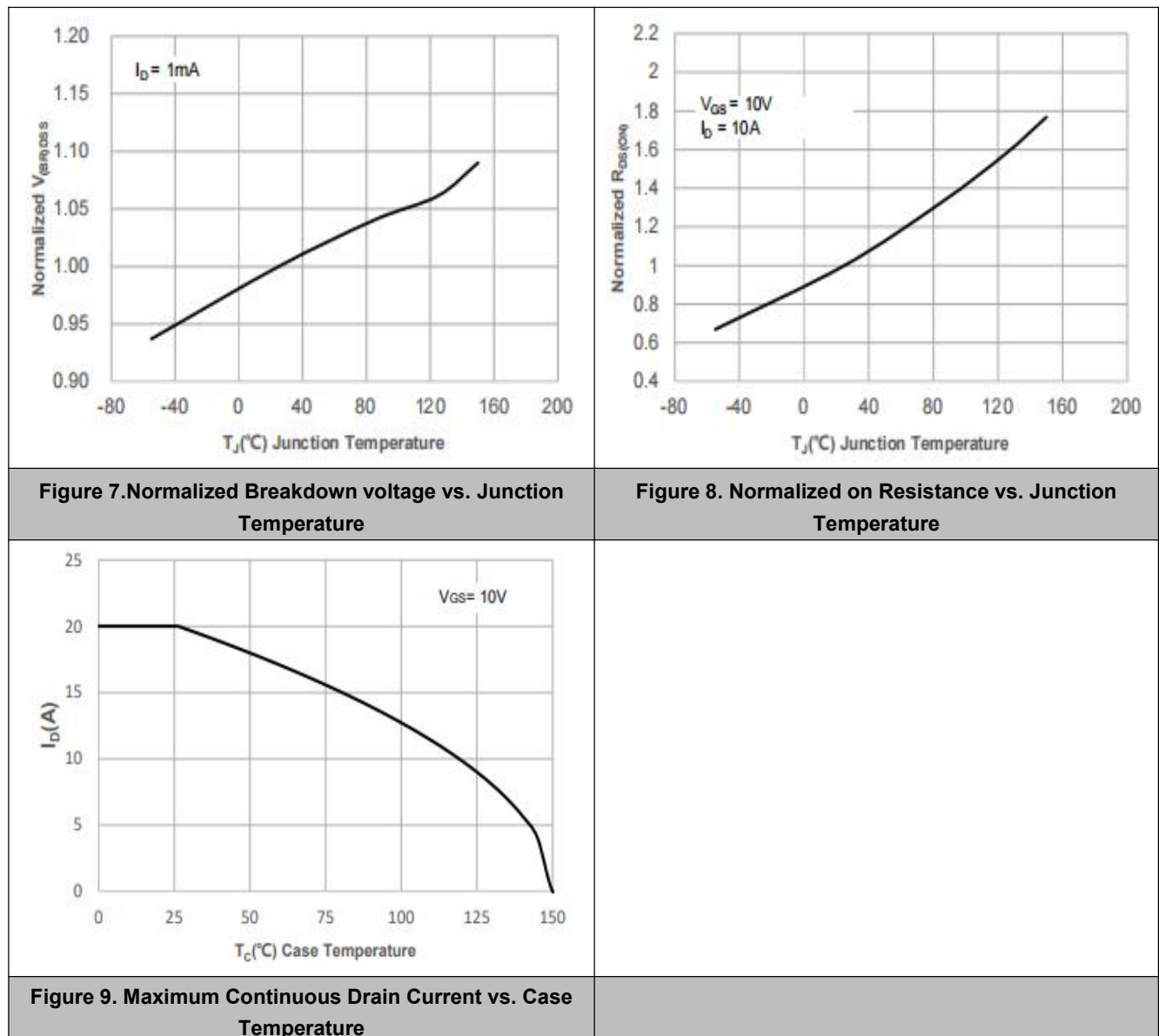
Notes:

- a: Max. current is limited by junction temperature.
- b: The EAS data shows Max. Rating. The test condition:
N-MOS: $V_{DD} = 25V, V_{GS} = 10V, L = 0.5mH, I_{AS} = 8A.$
P-MOS: $V_{DD} = -25V, V_{GS} = -10V, L = 0.5mH, I_{AS} = -9A.$
- c: Surface Mounted on 1in2 FR-4 board with 1oz.
- d: Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).
- e: Guaranteed by design, not subject to production testing.

■ Typical Characteristics(N-Channel)



■ Typical Characteristics(N-Channel)



■ Typical Characteristics(P-Channel)

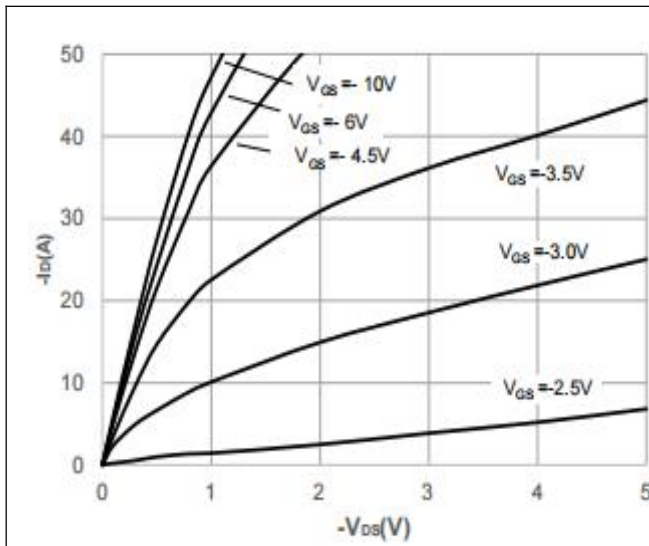


Figure 1. Typical Output Characteristics

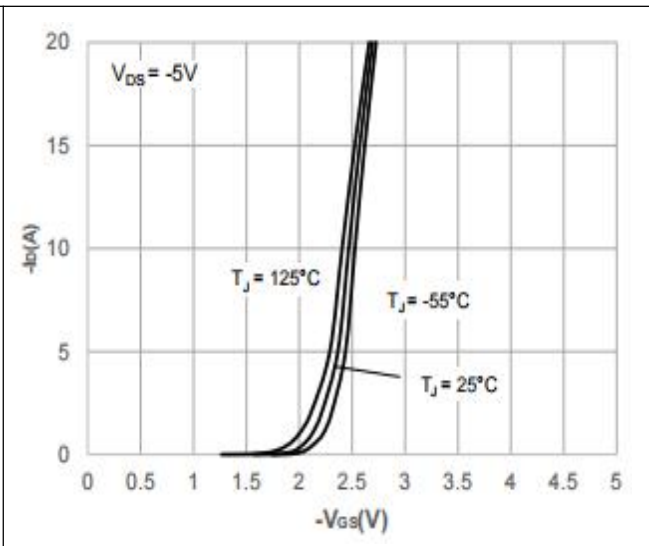


Figure 2. Typical Transfer Characteristics

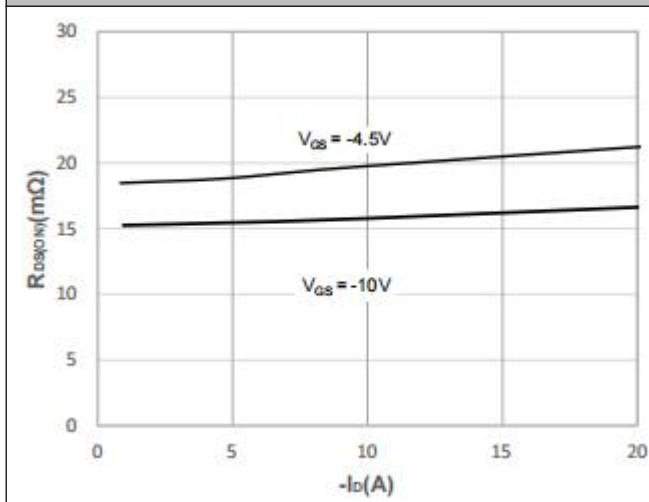


Figure 3. On- Resistance vs. Drain Current

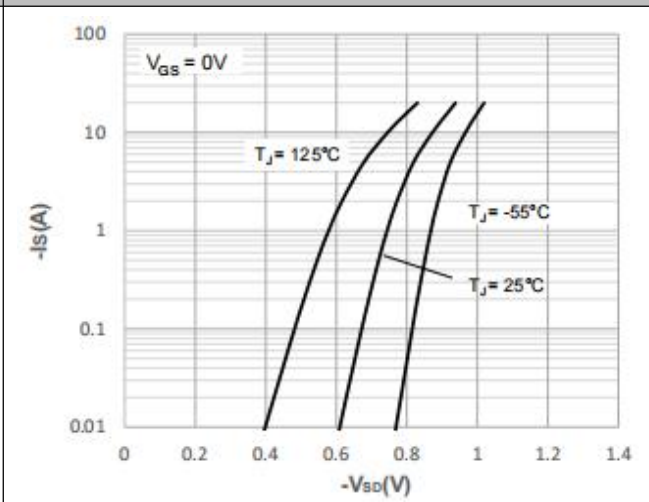


Figure 4. Body-Diode Characteristics

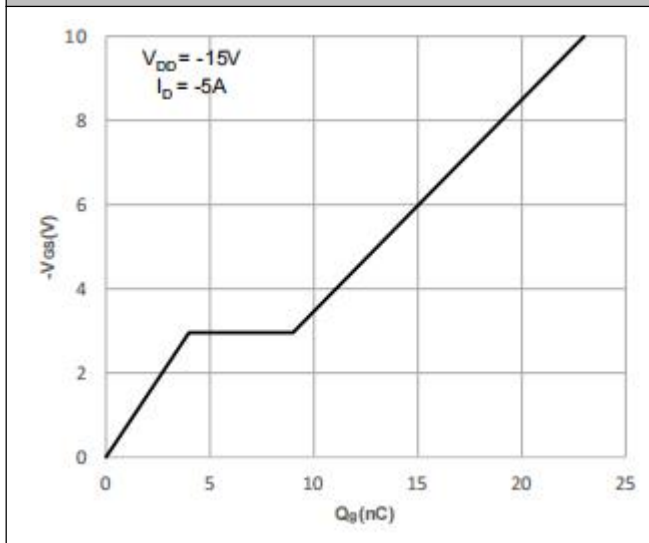


Figure 5. Gate-Charge Characteristics

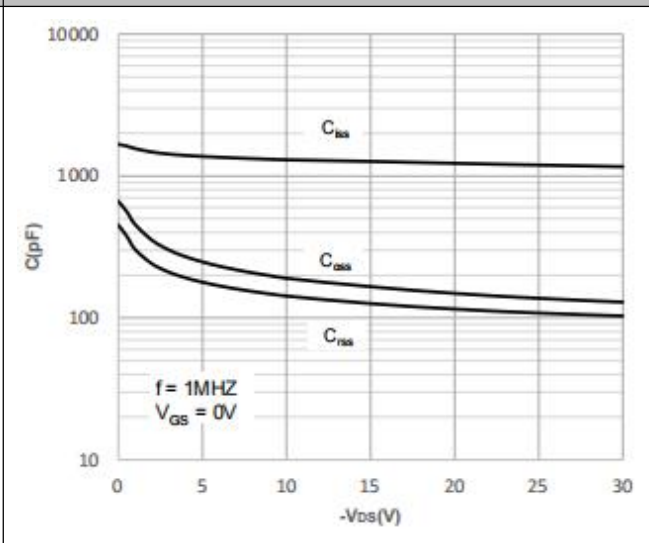
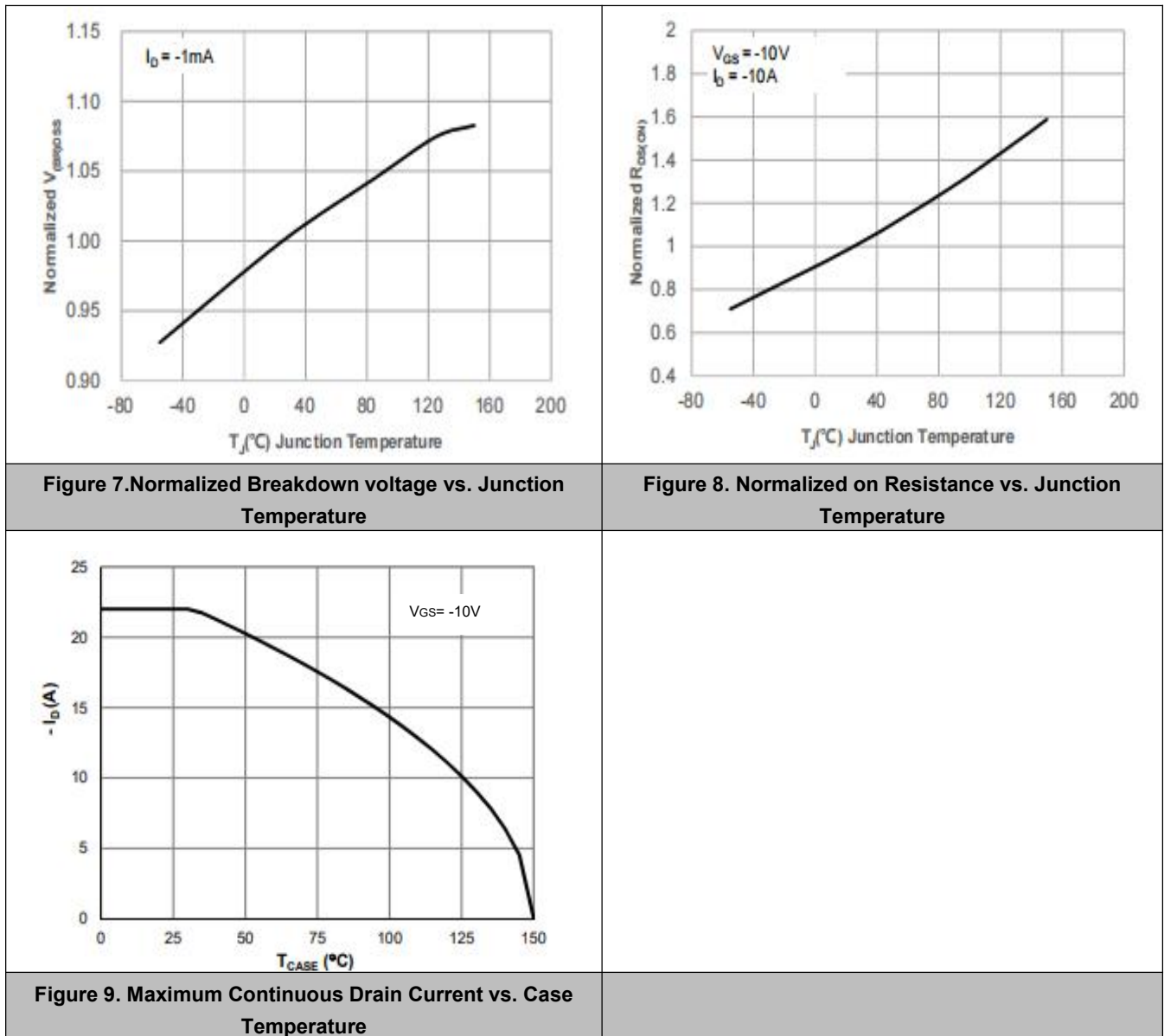
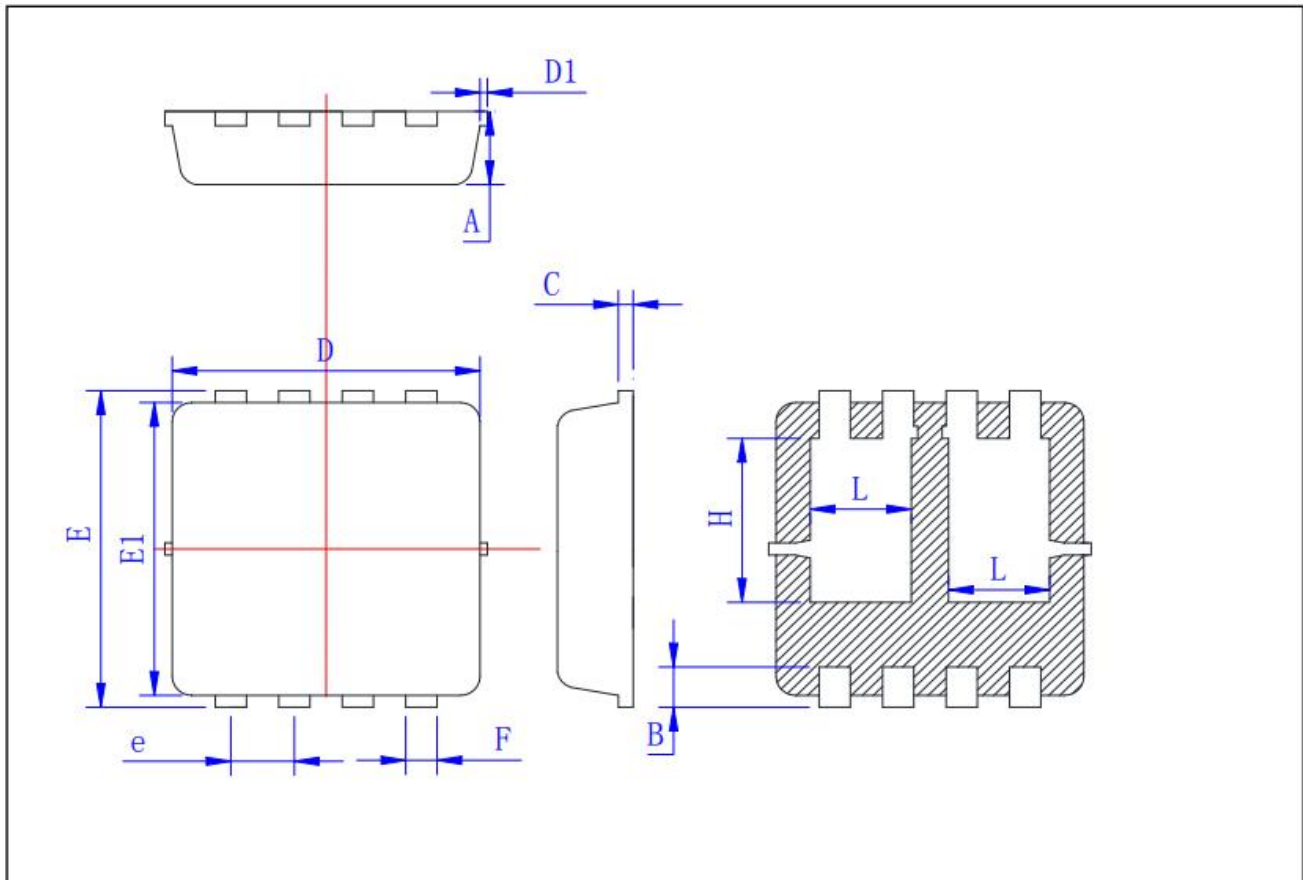


Figure 6. Capacitance Characteristics

■ Typical Characteristics(P-Channel)



■ Package Information



Symbol	Min. (mm)	Typ. (mm)	Max.(mm)
A	0.725	0.775	0.825
B	0.28	0.38	0.48
C	0.13	0.15	0.20
D	3.05	3.15	3.25
D1			0.10
E	3.25	3.35	3.45
E1	3.0	3.1	3.2
e	0.60	0.65	0.70
F	0.25	0.30	0.35
H	1.63	1.73	1.83
L	0.93	1.03	1.13