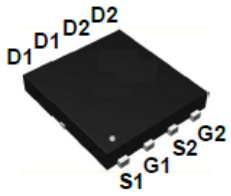
40V N+P-Channel MOSFET

Features

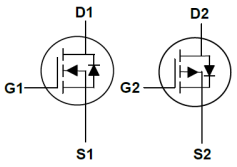
- High Speed Power Switching
- Reliable and Rugged
- ROHS Compliant
- 100% Avalanche Tested

Pin Description

DFN5X6 EP2



Symbol



Applications

- Power Management in Desktop Computer
- DC/DC Converters

	N-ch	P-ch	
V_{DSS}	40	-40	V
$R_{DS(ON)-Typ}$	13	31	mΩ
I_D	36	-25	A

Absolute Maximum Ratings(T_A=25℃, Unless Otherwise Noted)

Symbol	Parameter	N-Ch	P-Ch	Unit
V_{DSS}	Drain-Source Voltage	40	-40	V
V_{GSS}	Gate-Source Voltage	±20	±20	V
T_J	Maximum Junction Temperature	-55 to 150		℃
T_{STG}	Storage Temperature Range	-55 to 150		℃
I_{DM}①	Pulse Drain Current Tested	144	-100	A
I_D	Continuous Drain Current	36	-25	A
P_D	Maximum Power Dissipation	32	32	W
E_{AS}	Avalanche Energy, Single pulse	39.2	45	mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	65	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.9	℃/W

Note ①: Max. current is limited by bonding wire.

Note ②: UIS tested and pulse width are limited by maximum junction temperature 150℃.

Note ③: Surface Mounted on 1in^2 FR-4 board with 1oz.

N-ch Electrical Characteristics (T_J=25℃, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V	---	---	1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=250uA	1.2	---	2.0	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=10V, I_D=10A	---	10	13	mΩ
		V_{GS}=4.5V, I_D=6A	---	12	16	mΩ
Dynamic Characteristics⑤						
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.3	---	Ω
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, Freq.=1MHz	---	1310	---	pF
C_{oss}	Output Capacitance		---	105	---	
C_{rss}	Reverse Transfer Capacitance		---	78	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=20V,V_{GS}=10V, I_D=10A,R_G=3Ω	---	5.6	---	nS
T_r	Turn-on Rise Time		---	4.1	---	
$T_{d(off)}$	Turn-off Delay Time		---	22	---	
T_f	Turn-off Fall Time		---	4.6	---	
Q_g	Total Gate Charge	V_{DS}=20V,V_{GS}=10V, I_D=10A	---	23.5	---	nC
Q_{gs}	Gate-Source Charge		---	3.4	---	
Q_{gd}	Gate-Drain Charge		---	3.8	---	
Source-Drain Characteristics						
V_{SD}	Diode Forward Voltage	I_S=10A, V_{GS}=0V	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_F=10A, dI_F/dt=100A/us	---	16	---	nS
Q_{rr}	Reverse Recovery Charge		---	5	---	nC

Note ④： Pulse test (pulse width≤300us, duty cycle≤2%).

Note ⑤ : Guaranteed by design, not subject to production testing.

P-ch Electrical Characteristics (T_J=25℃, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V	---	---	-1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_D=-250uA	-1.2	---	-2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=-10V, I_D=-10A	---	25	31	mΩ
		V_{GS}=-4.5V, I_D=-6A	---	31	40	mΩ
Dynamic Characteristics⑤						
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	11	---	Ω
C_{iss}	Input Capacitance	V_{DS}=-20V, V_{GS}=0V, Freq.=1MHz	---	1350	---	pF
C_{oss}	Output Capacitance		---	108	---	
C_{rss}	Reverse Transfer Capacitance		---	94	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=-20V,V_{GS}=-10V, I_D=-10A,R_G=3Ω	---	5	---	nS
T_r	Turn-on Rise Time		---	19.5	---	
$T_{d(off)}$	Turn-off Delay Time		---	75	---	
T_f	Turn-off Fall Time		---	46	---	
Q_g	Total Gate Charge	V_{DS}=-20V,V_{GS}=-10V, I_D=-10A	---	29	---	nC
Q_{gs}	Gate-Source Charge		---	4.2	---	
Q_{gd}	Gate-Drain Charge		---	5.5	---	
Source-Drain Characteristics						
V_{SD}	Diode Forward Voltage	I_S=-10A, V_{GS}=0V	---	---	-1.2	V

Note ④： Pulse test (pulse width≤300us, duty cycle≤2%).

Note ⑤ : Guaranteed by design, not subject to production testing.

N-ch Typical Characteristics

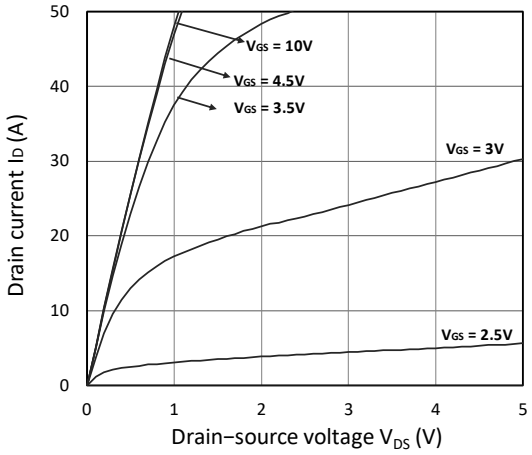


Figure 1. Output Characteristics

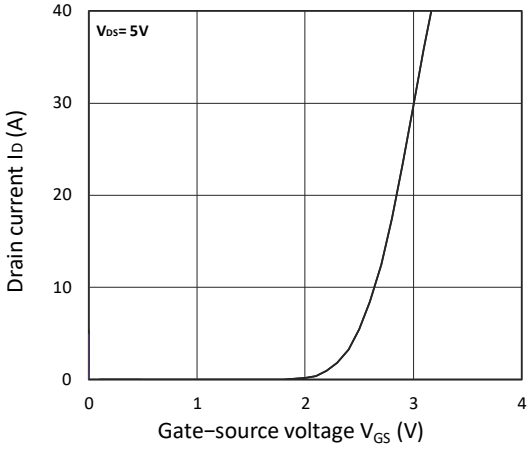


Figure 2. Transfer Characteristics

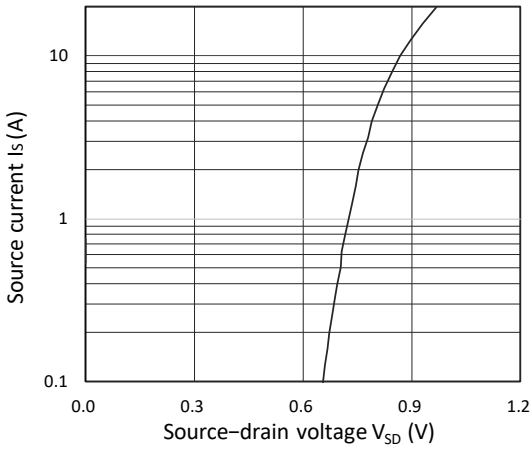


Figure 3. Forward Characteristics of Reverse

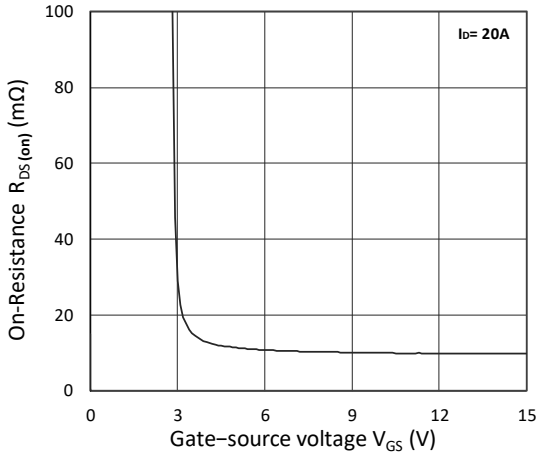


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

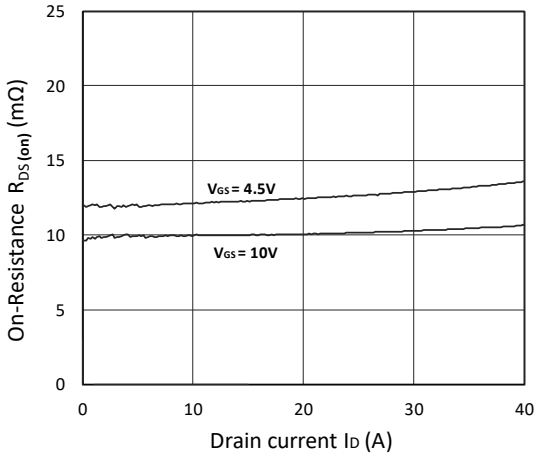


Figure 5. $R_{DS(ON)}$ vs. I_D

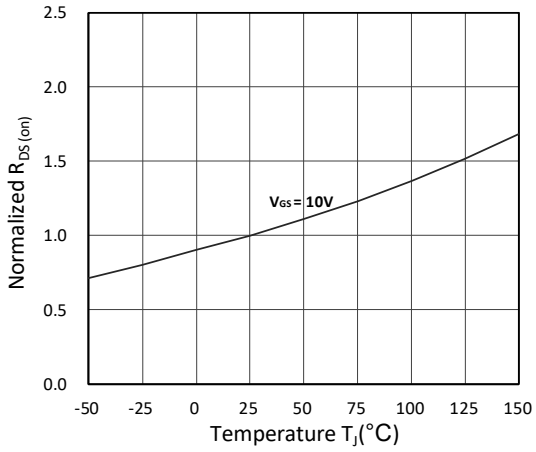


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

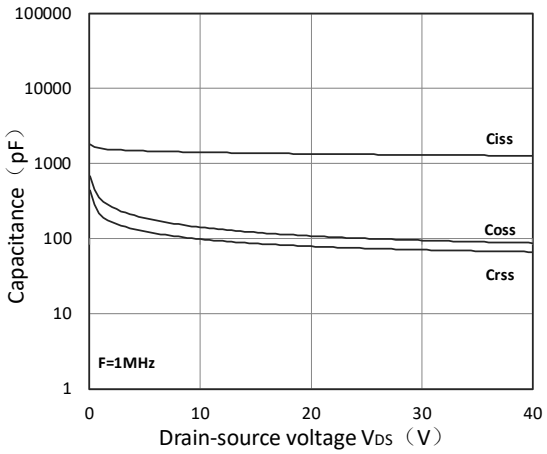


Figure 7. Capacitance Characteristics

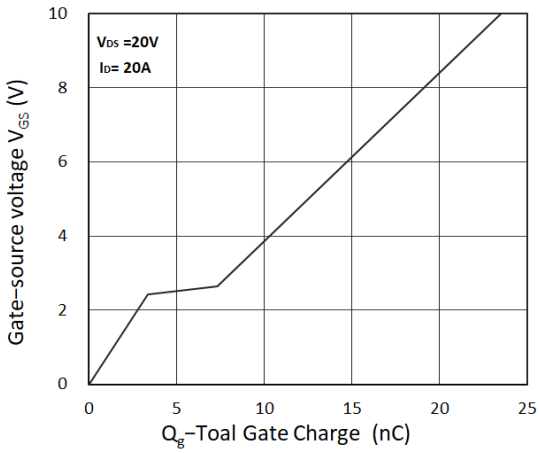


Figure 8. Gate Charge Characteristics

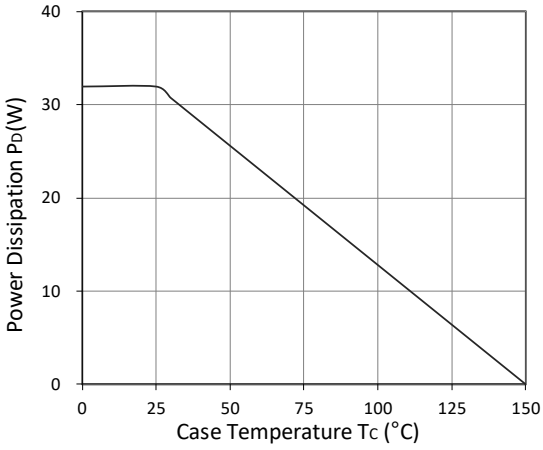


Figure 9. Power Dissipation

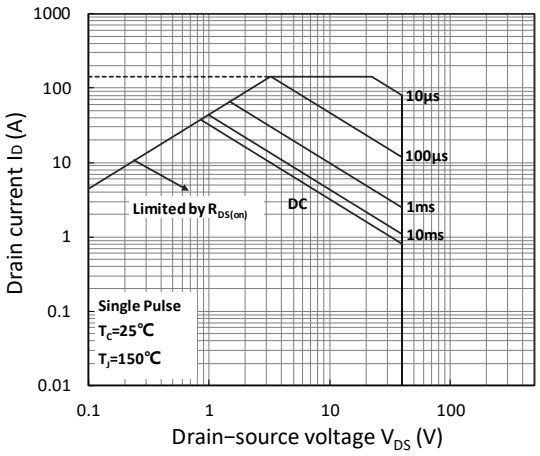


Figure10. Safe Operating Area

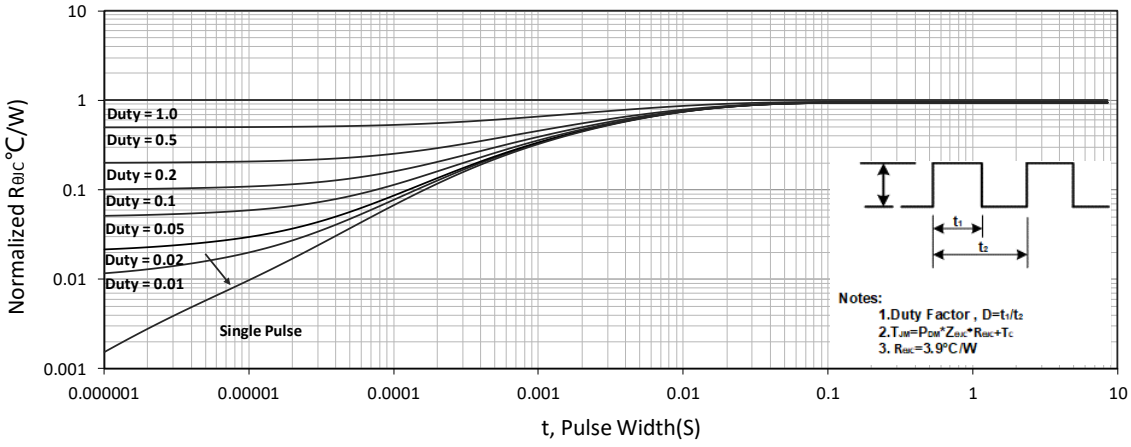


Figure 11. Normalized Maximum Transient Thermal Impedance

P-ch Typical Characteristics

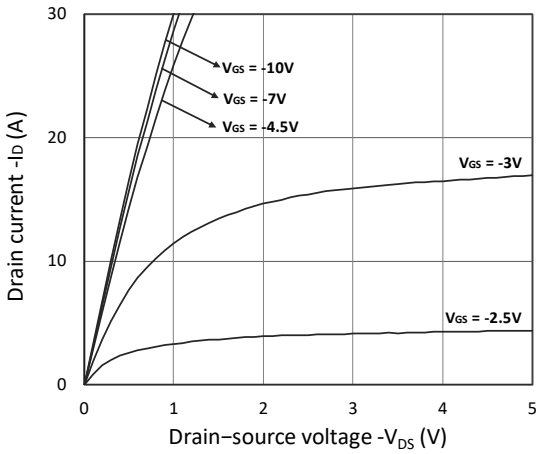


Figure 1. Output Characteristics

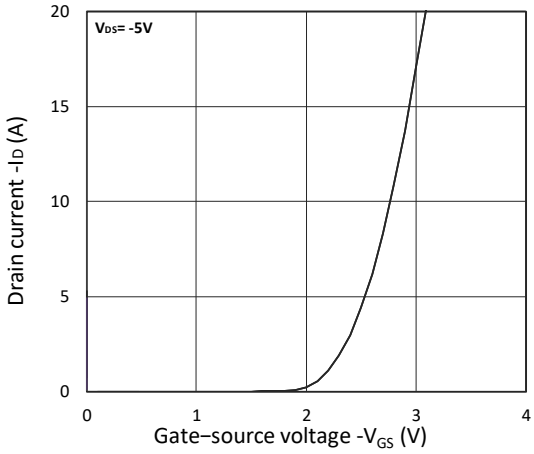


Figure 2. Transfer Characteristics

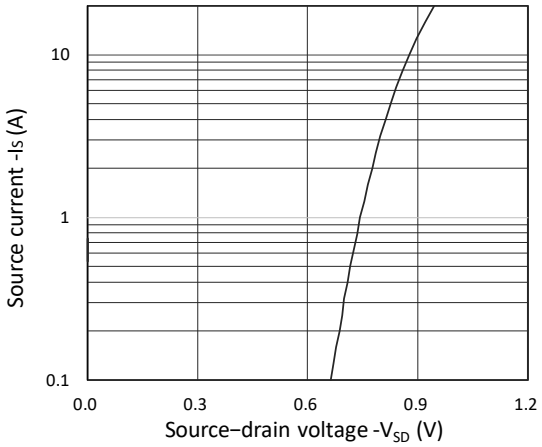


Figure 3. Forward Characteristics of Reverse

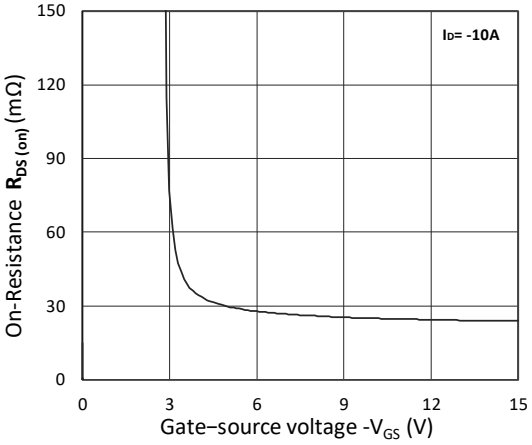


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

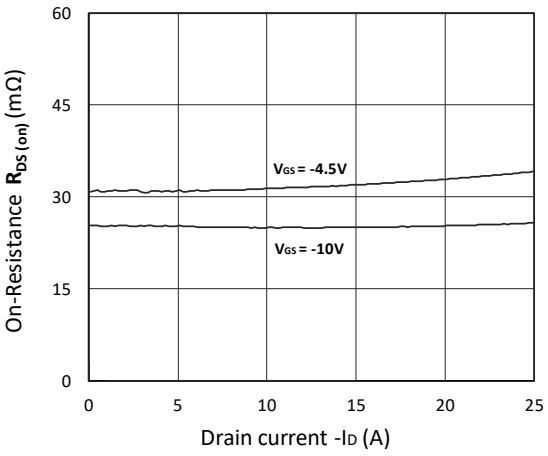


Figure 5. $R_{DS(ON)}$ vs. I_D

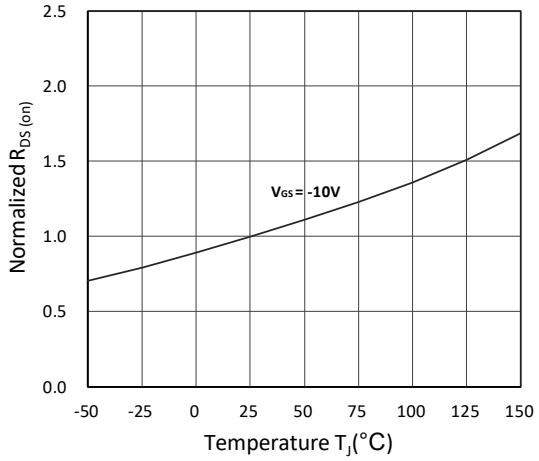


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

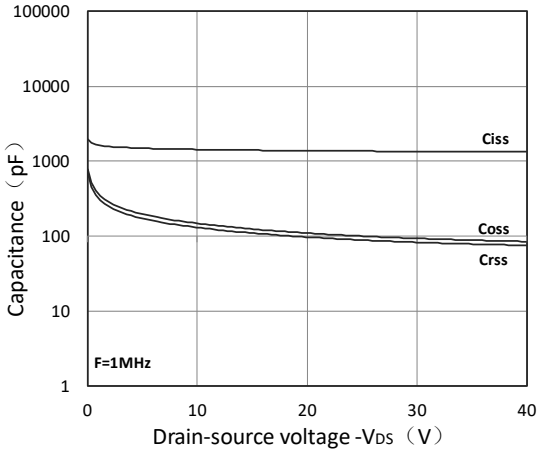


Figure 7. Capacitance Characteristics

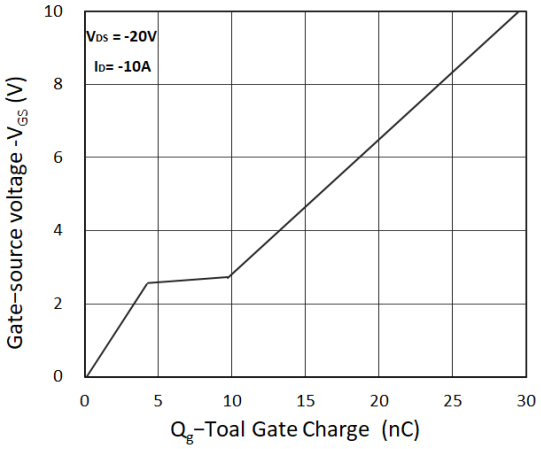


Figure 8. Gate Charge Characteristics

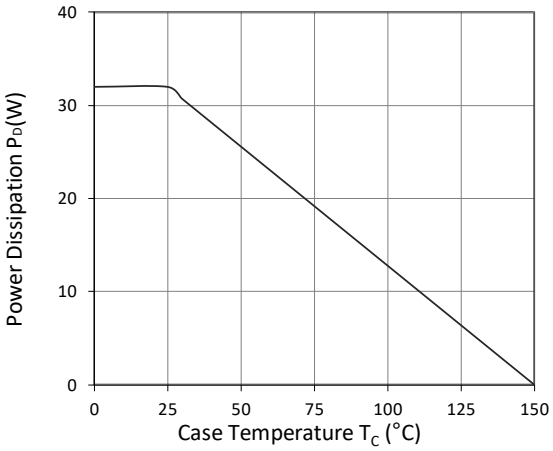


Figure 9. Power Dissipation

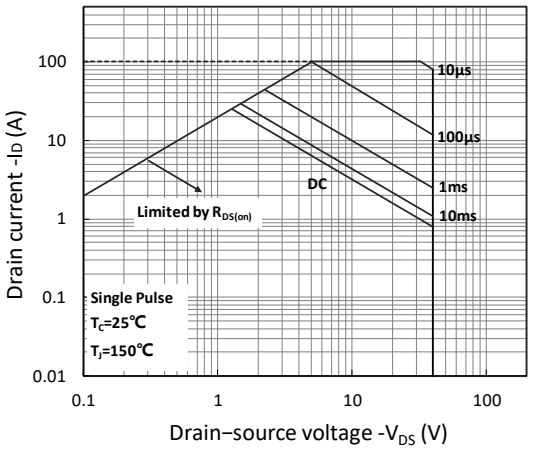


Figure10. Safe Operating Area

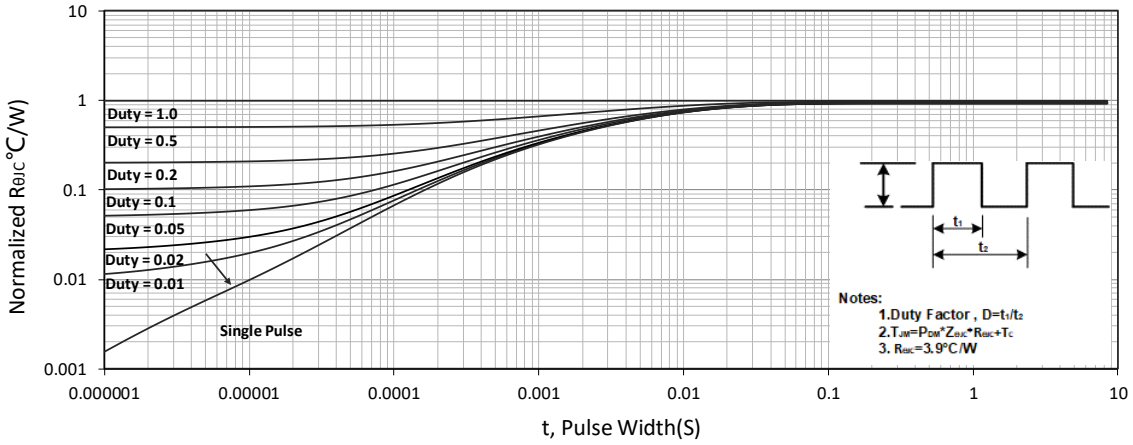
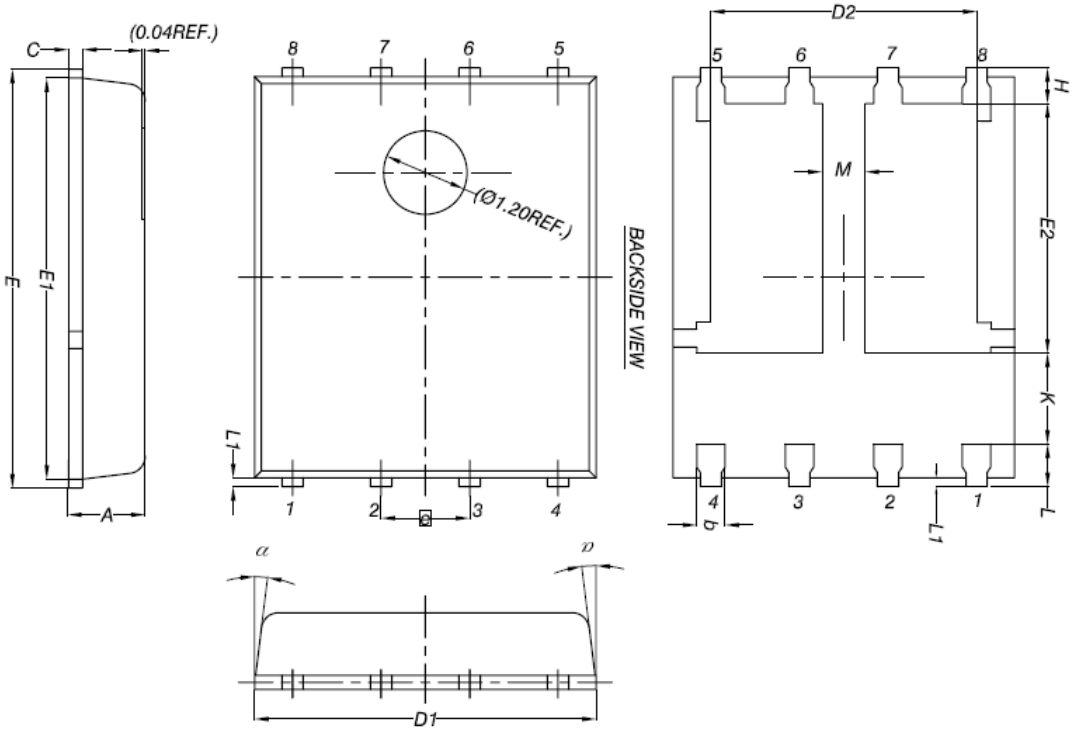


Figure 11. Normalized Maximum Transient Thermal Impedance

40V N+P-Channel MOSFET

DFN5×6 EP2 Package Outline Data



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	e	1.270 BSC		0.050 BSC	
b	0.330	0.510	0.013	0.020	H	0.410	0.610	0.016	0.024
C	0.200	0.300	0.008	0.012	K	1.100	-	0.043	-
D1	4.800	5.000	0.189	0.197	L	0.510	0.710	0.020	0.028
D2	3.610	3.960	0.142	0.156	L1	0.060	0.200	0.002	0.008
E	5.900	6.100	0.232	0.240	M	0.500	-	0.020	-
E1	5.700	5.800	0.224	0.228	α	0°	12°	0°	12°
E2	3.380	3.780	0.133	0.149					