

Features

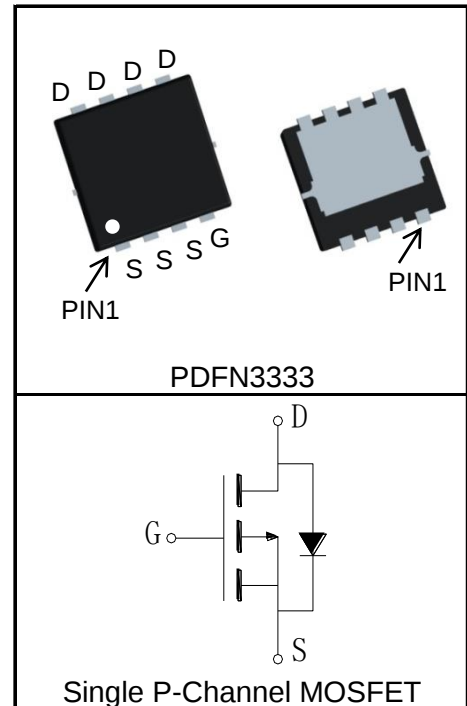
- -40V/-40A,
 $R_{DS(ON)} = 10m\Omega(Typ.)@V_{GS}=-10V$
 $R_{DS(ON)} = 13m\Omega(Typ.)@V_{GS}=-4.5V$
- Low $R_{DS(ON)}$
- Super High Dense Cell Design
- Fast Switching Speed
- 100% avalanche tested

Applications

- Switching Application Systems



Pin Description



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T _C =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		-40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
I _S	Diode Continuous Forward Current	T _C =25°C	-40	A
Mounted on Large Heat Sink				
I _{DP} ^①	300μs Pulse Drain Current Tested	T _C =25°C	-160	A
I _D ^②	Continuous Drain Current@T _C (V _{GS} =-10V)	T _C =25°C	-40	A
		T _C =100°C	-25	
	Continuous Drain Current@T _A (V _{GS} =-10V) ^③	T _A =25°C	-13	
		T _A =70°C	-10	
P _D	Maximum Power Dissipation@T _C	T _C =25°C	36	W
		T _C =100°C	14	
	Maximum Power Dissipation@T _A ^③	T _A =25°C	3.5	
		T _A =70°C	2.3	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.5	°C/W
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	35	°C/W
Drain-Source Avalanche Ratings			
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed	49	mJ

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ Unless Otherwise Noted)

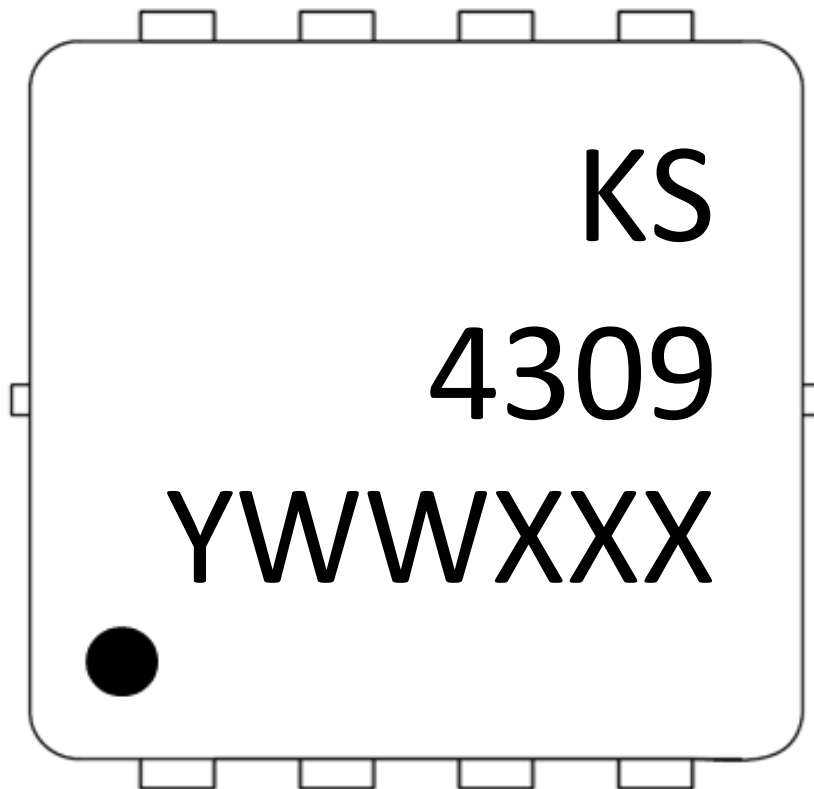
Symbol	Parameter	Test Condition	KS4309MA			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V			-1	μA
		T _J =125°C			-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.1	-1.6	-2.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
R _{DS(ON)} ⑤	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-15A		10	13	mΩ
		V _{GS} =-4.5V, I _{DS} =-10A		13	18	mΩ
Diode Characteristics						
V _{SD} ⑤	Diode Forward Voltage	I _{SD} =-15A, V _{GS} =0V		-0.82	-1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =-15A, dI _{SD} /dt=100A/μs		32		ns
Q _{rr}	Reverse Recovery Charge			65		nC
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		4.3		Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, Frequency=1.0MHz		2280		pF
C _{oss}	Output Capacitance			285		
C _{rss}	Reverse Transfer Capacitance			165		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-20V, I _{DS} =-15A, V _{GS} =-10V, R _G =3Ω		13		ns
t _r	Turn-on Rise Time			31		
t _{d(OFF)}	Turn-off Delay Time			66		
t _f	Turn-off Fall Time			25		
Gate Charge Characteristics ⑥						
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-10V, I _{DS} =-15A		46		nC
Q _{gs}	Gate-Source Charge			12		
Q _{gd}	Gate-Drain Charge			9		

Notes:

- ①Pulse width limited by safe operating area.
- ②Calculated continuous current based on maximum allowable junction temperature.
- ③When mounted on 1 inch square copper board, $t \leq 10\text{sec}$.
- ④Limited by T_{Jmax} , $I_{AS} = -14\text{A}$, $L = 0.5\text{mH}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$, 100% tested and guaranteed.
- ⑤Pulse test; Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- ⑥Guaranteed by design, not subject to production testing.

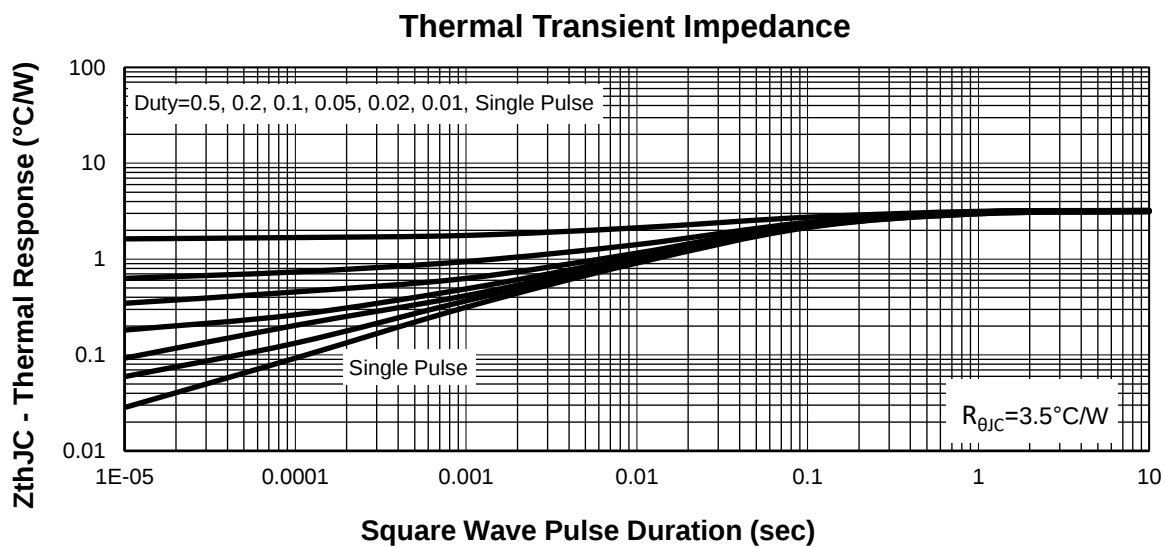
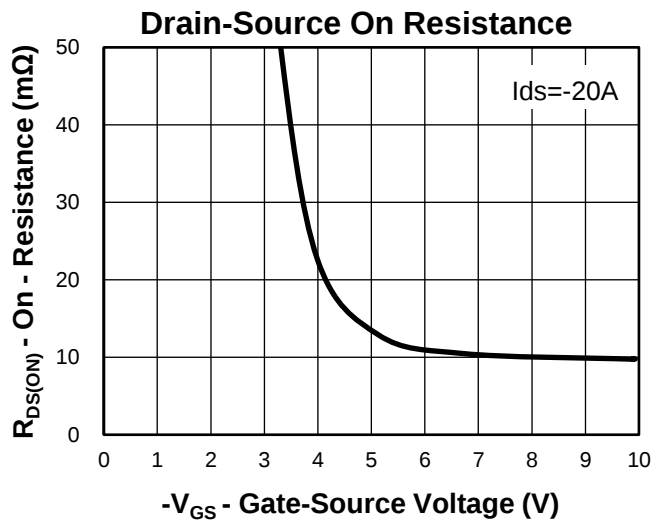
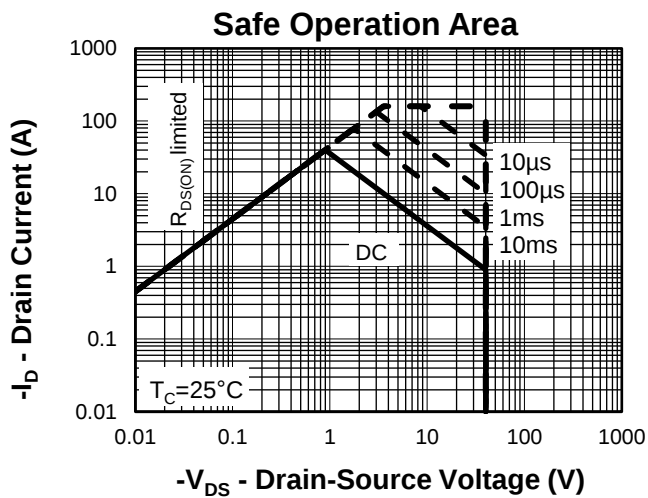
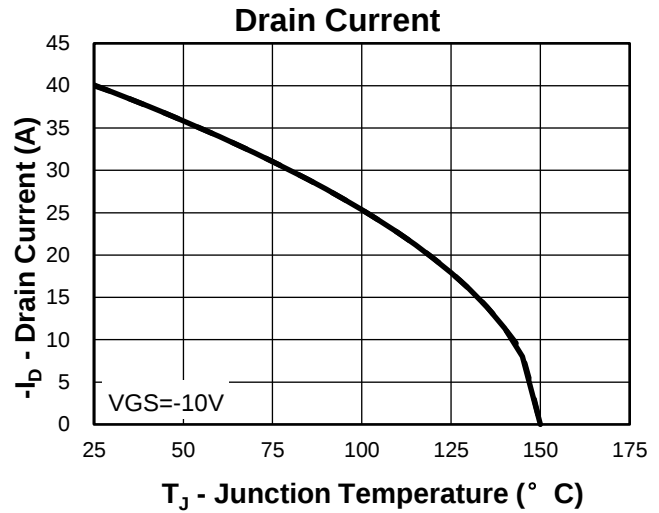
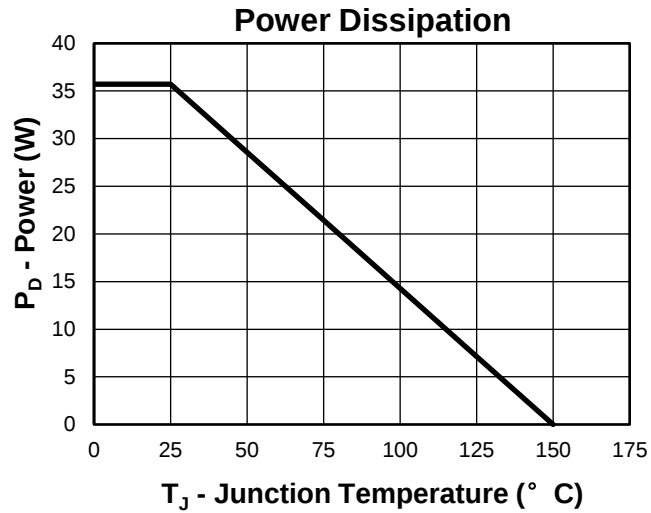
Ordering and Marking Information

Device	Package	Packaging	Quantity	Reel Size	Tape width
KS4309MA	PDFN3333	Tape&Reel	5000	13"	12mm

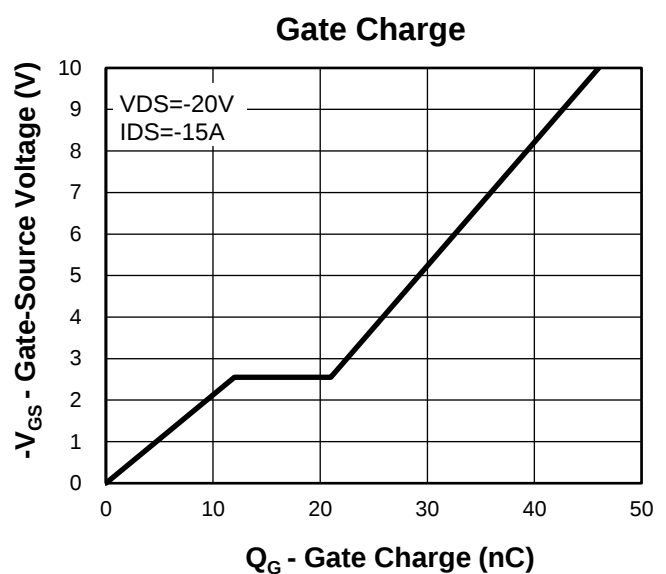
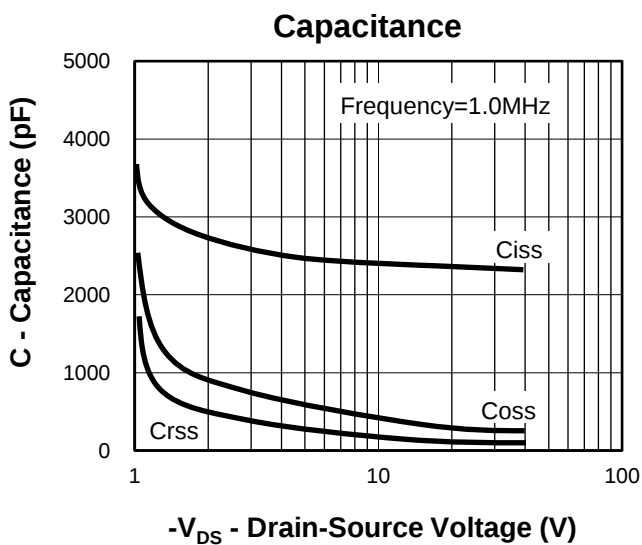
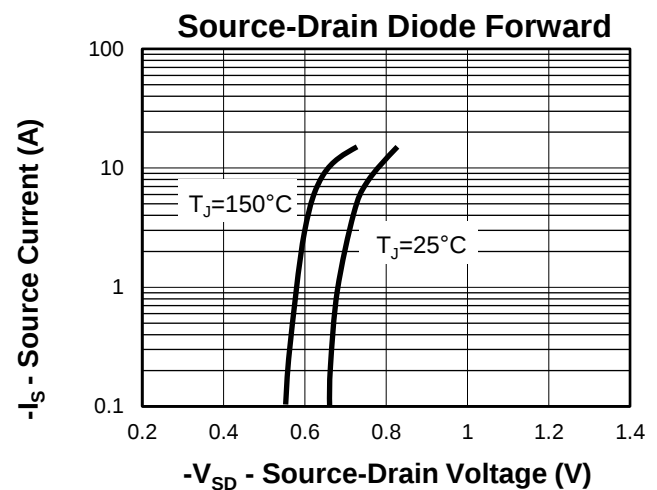
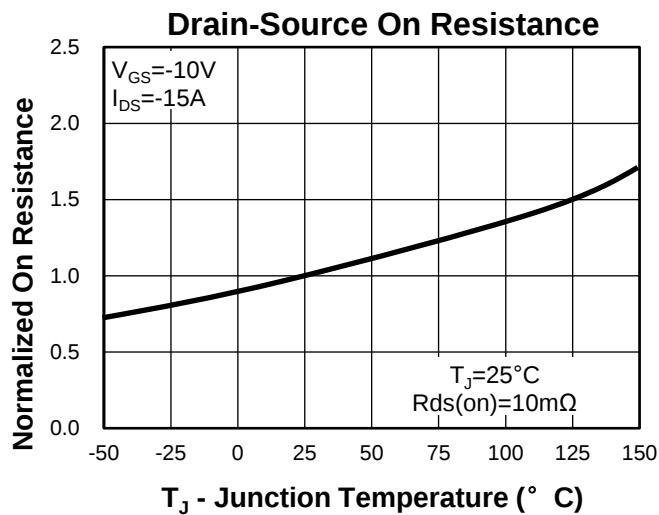
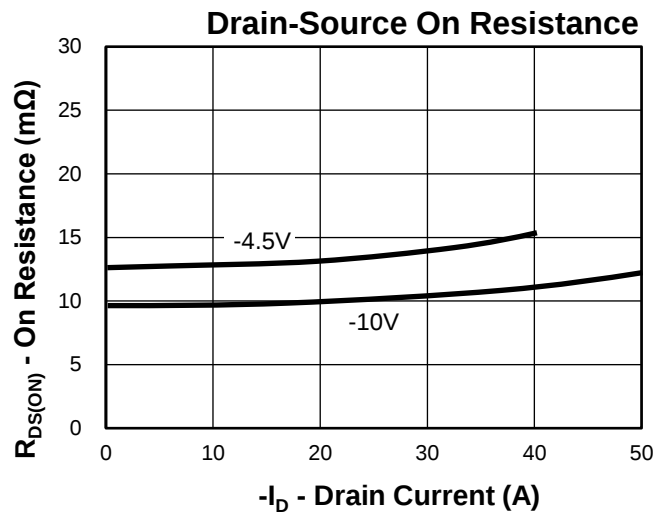
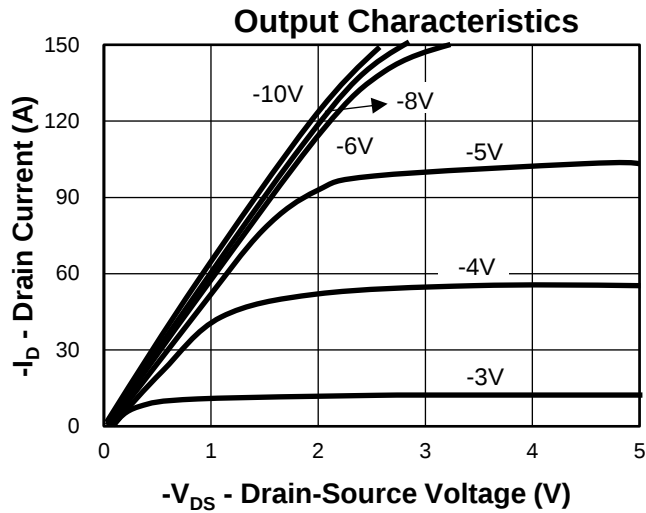


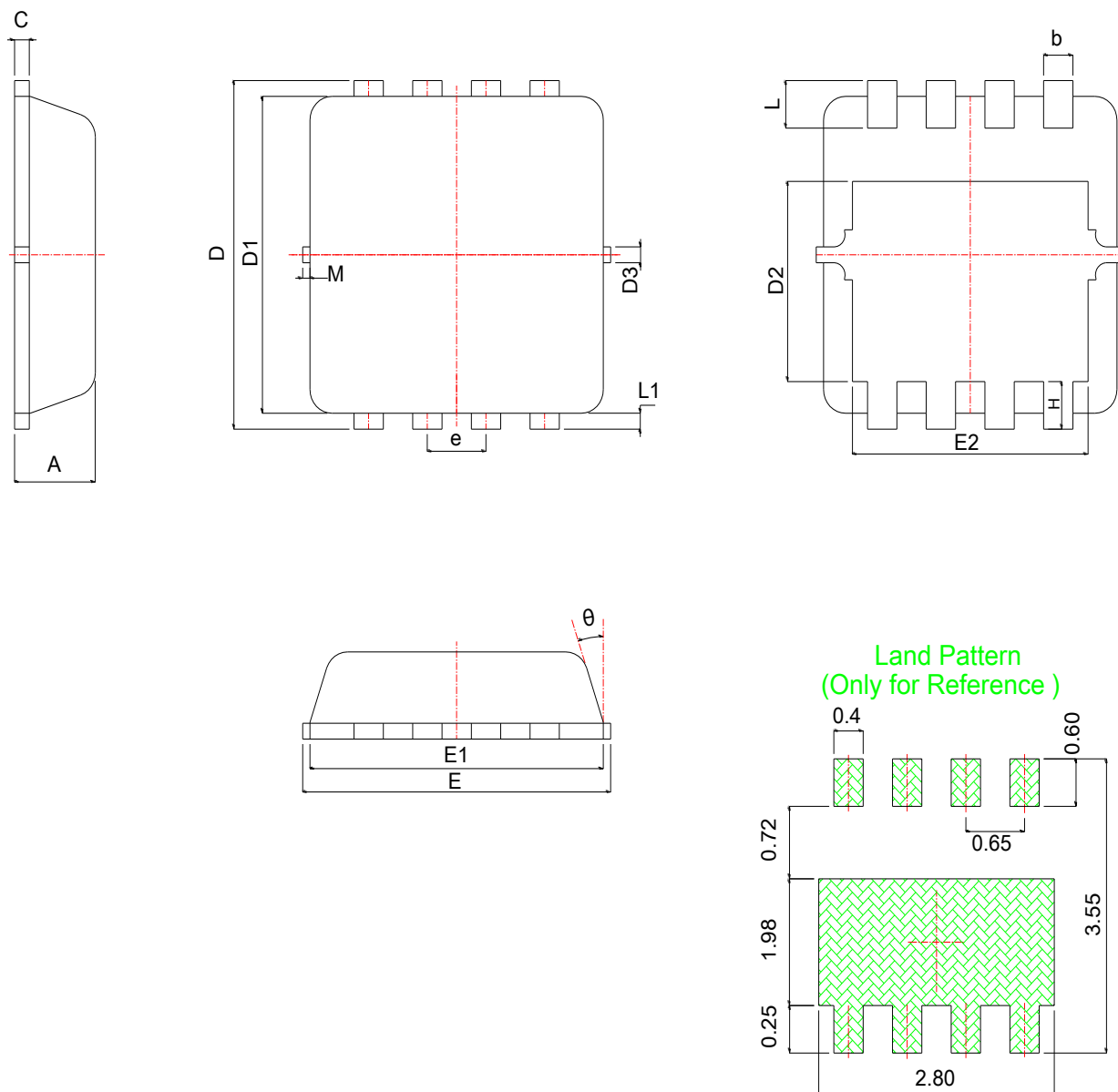
1st Line: Kwansemi Code(KS)
 2nd Line: Part Number(4309)
 3rd Line: Lot Number(YWWXXX)

Typical Characteristics



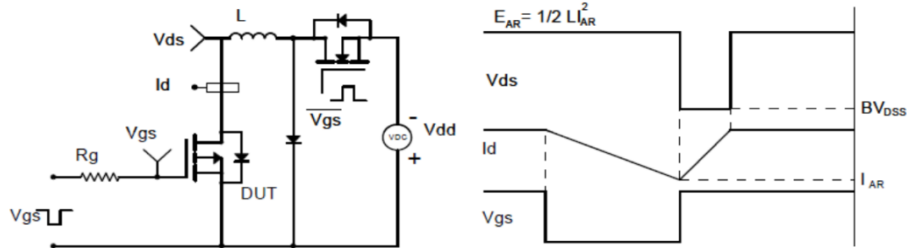
Typical Characteristics



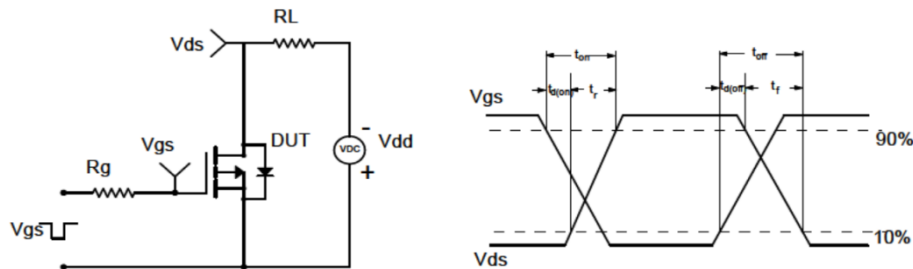
Package Information
PDFN3333


SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.67	0.78	0.88	0.026	0.031	0.035	E1	3.05	3.15	3.25	0.120	0.124	0.128
b	0.25	0.30	0.35	0.010	0.012	0.014	E2	2.25	2.45	2.65	0.089	0.096	0.104
c	0.10	0.15	0.25	0.004	0.006	0.010	e	0.65BSC			0.026BSC		
D	3.15	3.35	3.55	0.124	0.132	0.140	H	0.30	0.40	0.50	0.012	0.016	0.020
D1	3.00	3.10	3.20	0.118	0.122	0.126	L	0.30	0.40	0.50	0.012	0.016	0.020
D2	1.53	1.73	1.93	0.060	0.068	0.076	L1	*	0.13	*	*	0.005	*
D3	*	0.13	*	*	0.005	*	θ	*	10°	12°	*	10°	12°
E	3.10	3.30	3.50	0.122	0.130	0.138	M	*	*	0.15	*	*	0.006

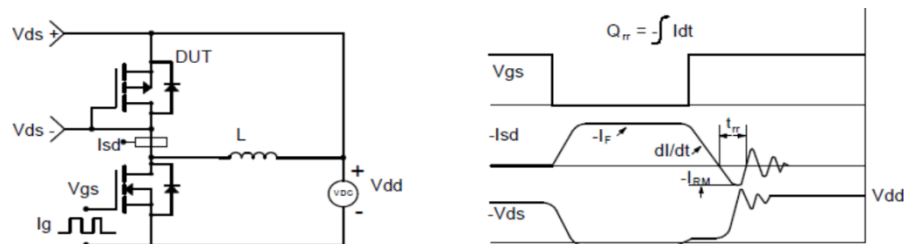
Avalanche Test Circuit and Waveforms



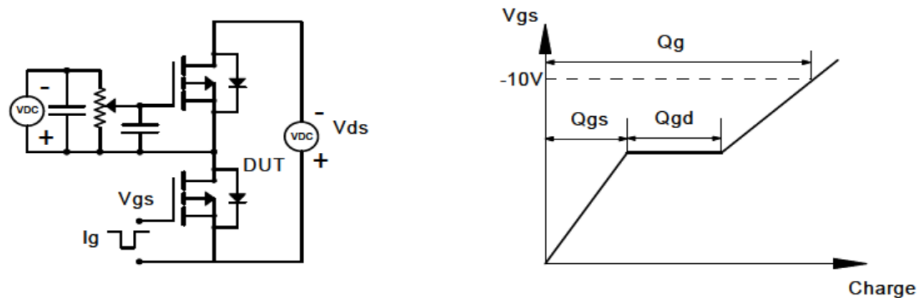
Switching Time Test Circuit and Waveforms



Diode Recovery Test Circuit and Waveforms



Gate Charge Test Circuit and Waveform



Customer Service

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