

Features

- -30V/-48A,
 $R_{DS(ON)} = 7.5m\Omega(Typ.)@V_{GS}=-10V$
 $R_{DS(ON)} = 11m\Omega(Typ.)@V_{GS}=-4.5V$
- Low $R_{DS(ON)}$
- Super High Dense Cell Design
- Fast Switching Speed
- 100% avalanche tested

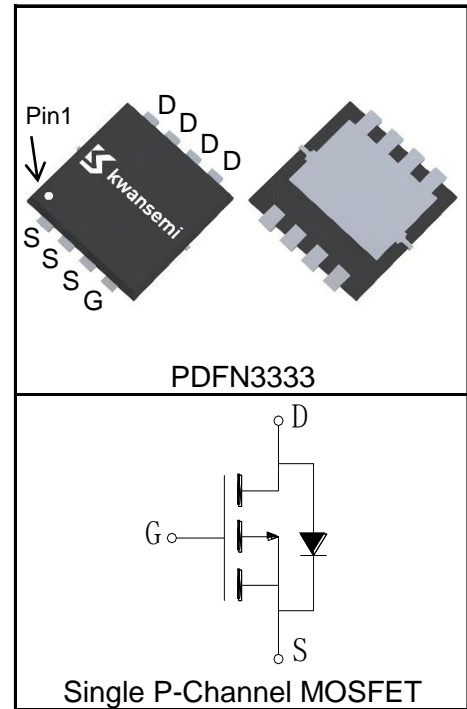
Applications

- Switching Application Systems



Halogen-Free

Pin Description



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	-30	V	
V_{GSS}	Gate-Source Voltage	± 25		
T_J	Maximum Junction Temperature	150	$^\circ C$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$	-48	A
Mounted on Large Heat Sink				
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ C$	-192	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=-10V)$	$T_C=25^\circ C$	-48	A
		$T_C=100^\circ C$	-30	
	Continuous Drain Current@ $T_A(V_{GS}=-10V)^{③}$	$T_A=25^\circ C$	-15	
		$T_A=70^\circ C$	-12	
P_D	Maximum Power Dissipation@ T_C	$T_C=25^\circ C$	36	W
		$T_C=100^\circ C$	14	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ C$	3.5	
		$T_A=70^\circ C$	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	64	mJ

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

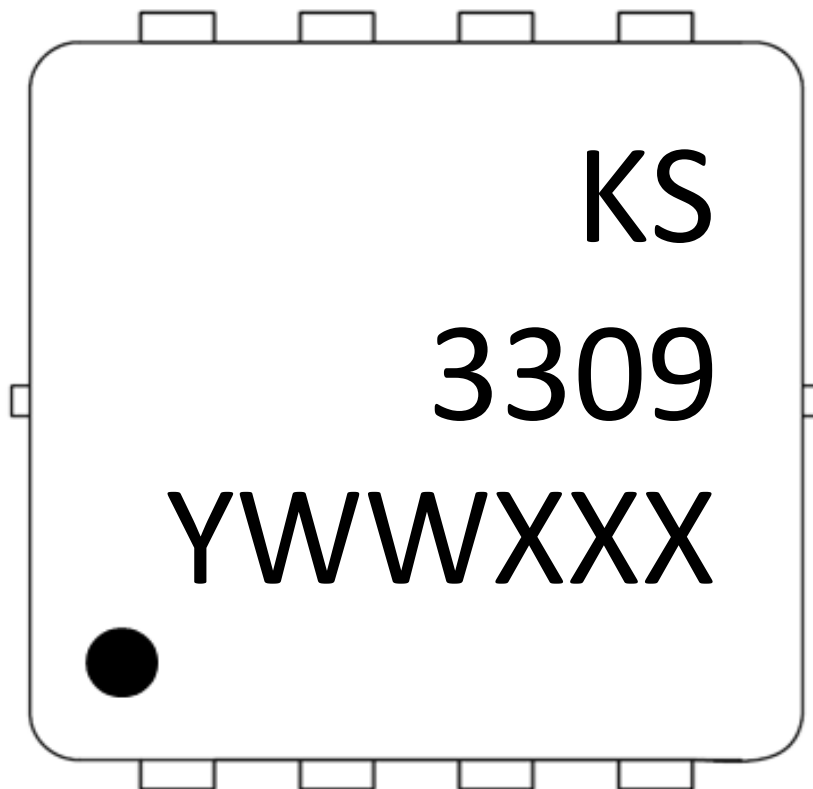
Symbol	Parameter	Test Condition	KS3309MA			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-30V, V_{GS}=0V$			-1	μA
		$T_J=125^\circ\text{C}$			-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.1	-1.6	-2.3	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}$ ⑤	Drain-Source On-state Resistance	$V_{GS}=-10V, I_{DS}=-20A$		7.5	9	$m\Omega$
		$V_{GS}=-4.5V, I_{DS}=-16A$		11	15	$m\Omega$
Diode Characteristics						
V_{SD} ⑤	Diode Forward Voltage	$I_{SD}=-20A, V_{GS}=0V$		-0.88	-1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=-20A, di_{SD}/dt=100A/\mu s$		35		ns
Q_{rr}	Reverse Recovery Charge			27		nC
Dynamic Characteristics ⑥						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		3		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-15V,$ Frequency=1.0MHz		2800		pF
C_{oss}	Output Capacitance			405		
C_{rss}	Reverse Transfer Capacitance			240		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-15V, I_{DS}=-20A, V_{GS}=-10V, R_G=3\Omega$		14		ns
t_r	Turn-on Rise Time			19		
$t_{d(OFF)}$	Turn-off Delay Time			57		
t_f	Turn-off Fall Time			21		
Gate Charge Characteristics ⑥						
Q_g	Total Gate Charge	$V_{DS}=-15V, V_{GS}=-10V,$ $I_{DS}=-20A$		49		nC
Q_{gs}	Gate-Source Charge			12		
Q_{gd}	Gate-Drain Charge			13		

Notes:

- ①Pulse width limited by safe operating area.
- ②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 40A.
- ③When mounted on 1 inch square copper board, $t \leq 10\text{sec}$.
- ④Limited by T_{Jmax} , $I_{AS} = -16\text{A}$, $L = 0.5\text{mH}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, 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
KS3309MA	PDFN3333	Tape&Reel	5000	13"	12mm

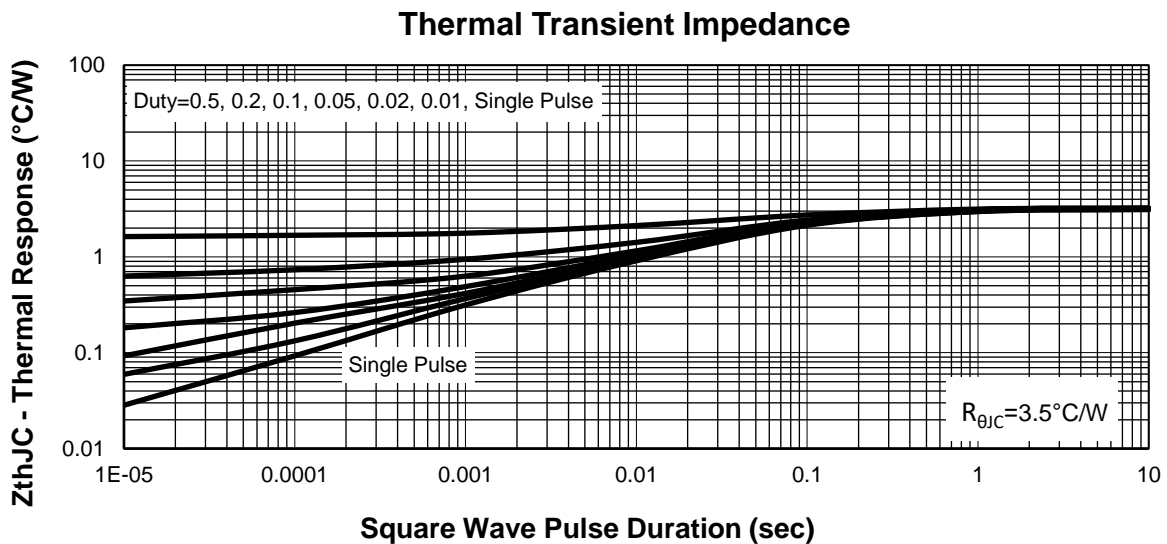
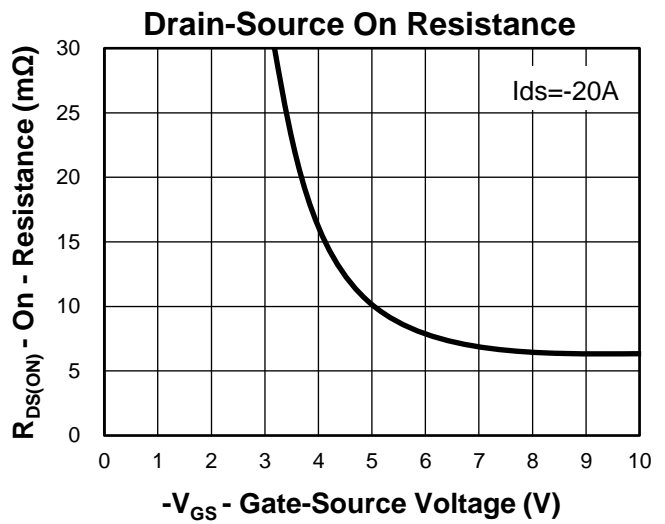
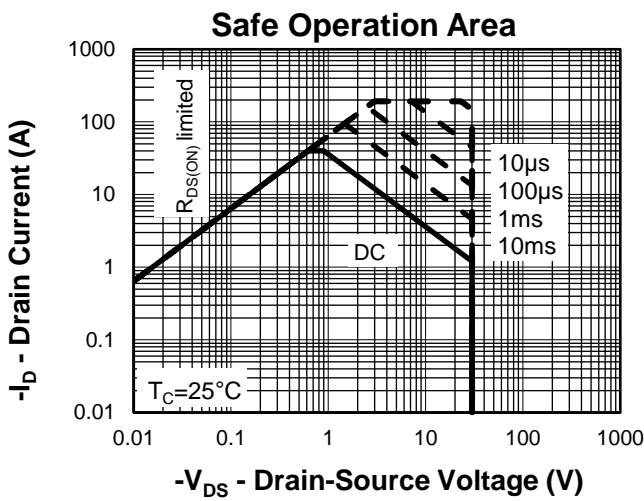
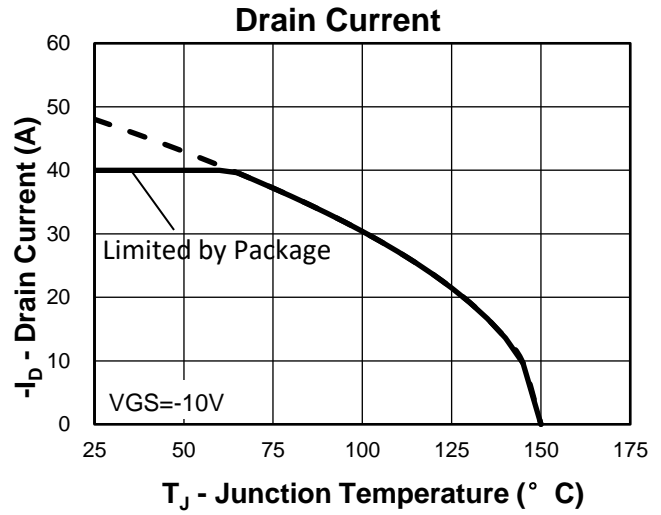
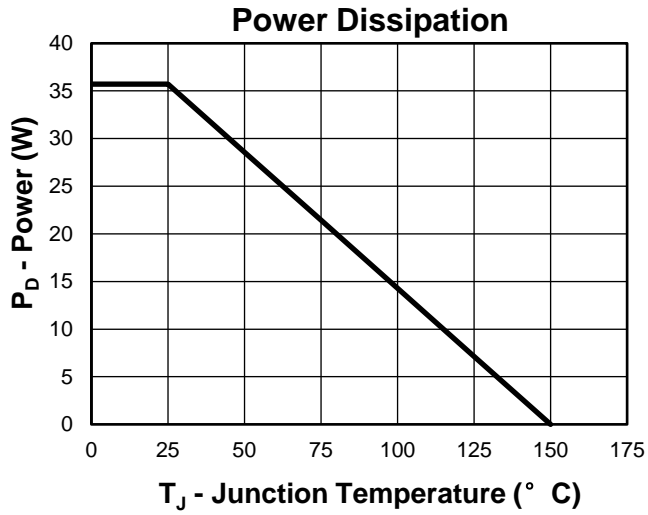


1st Line: Kwansemi Code(KS)

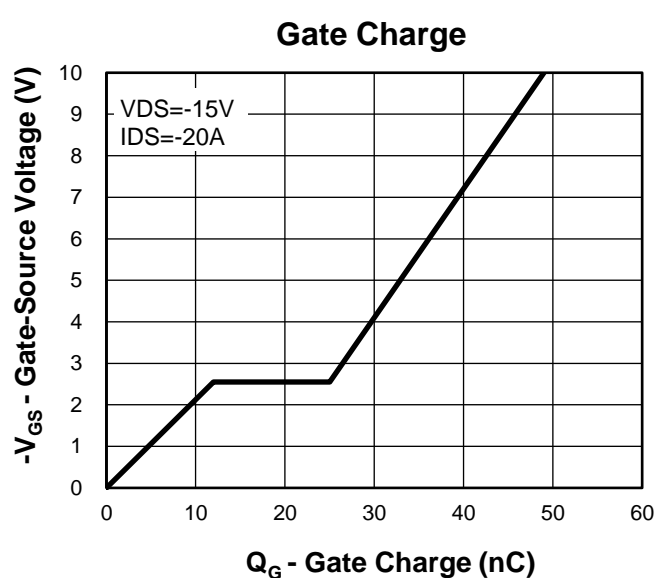
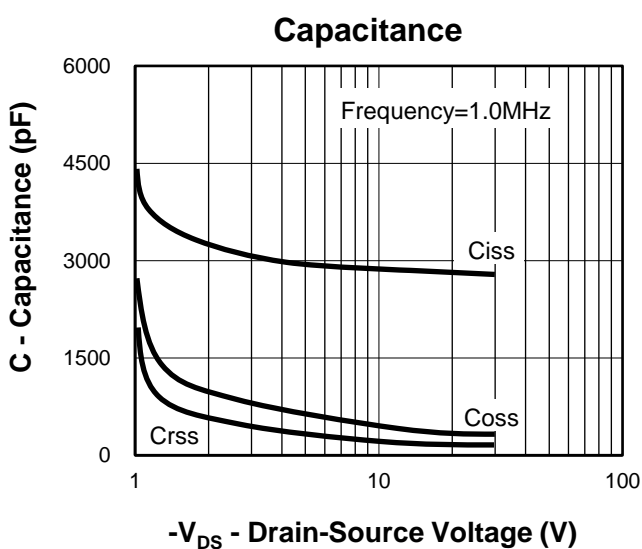
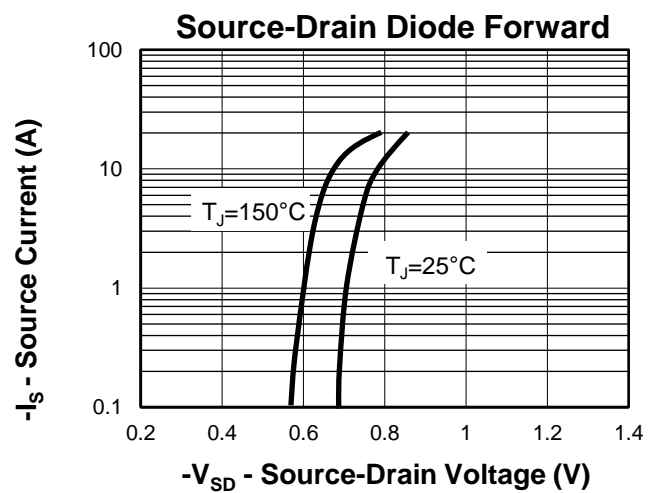
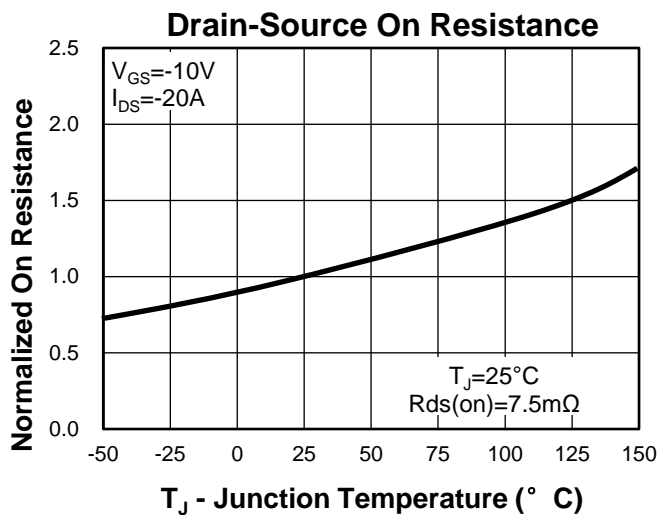
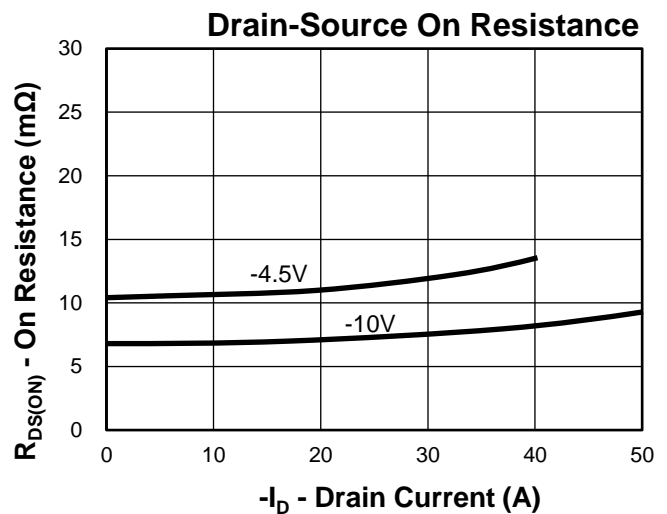
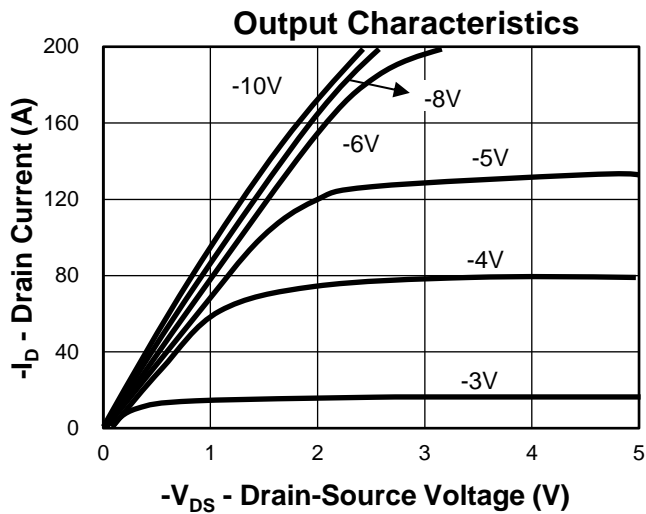
2nd Line: Part Number(3309)

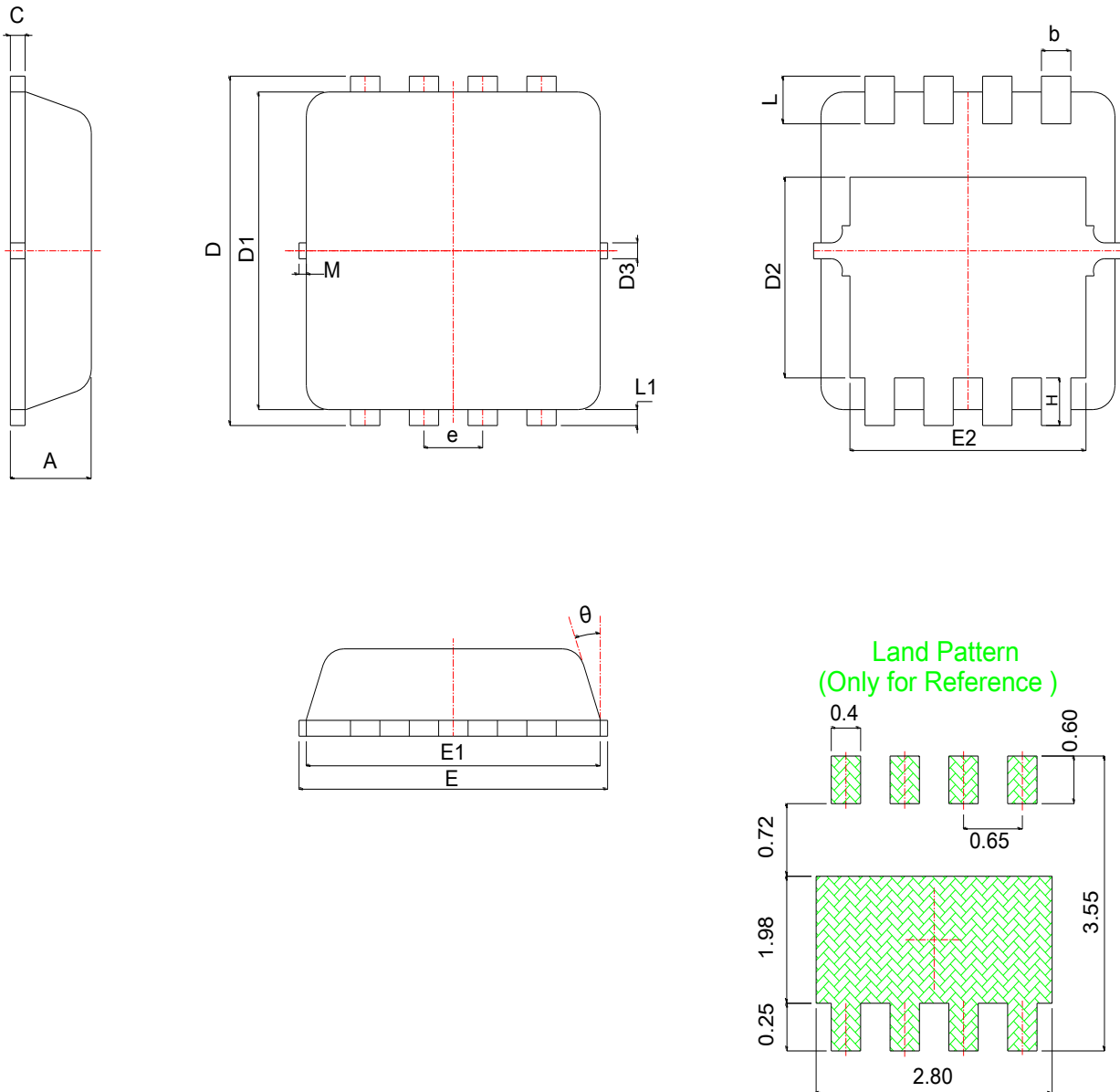
3rd Line: Lot Number(YWWXXX)

Typical Characteristics



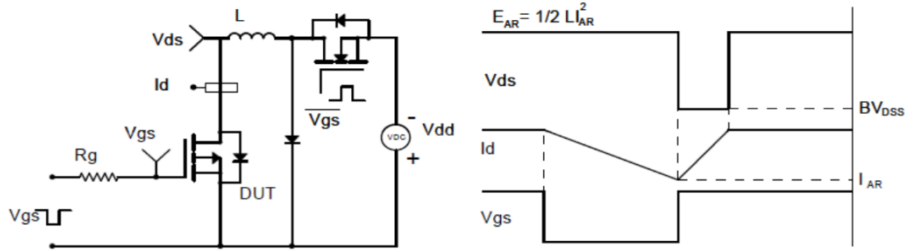
Typical Characteristics



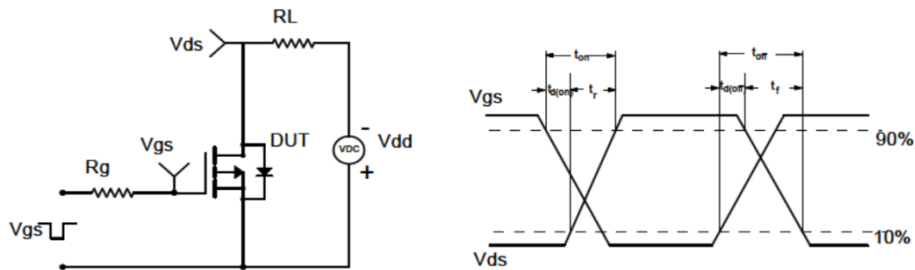
Package Information
PDFN3333


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	*	theta	*	10°	12°	*	10°	12°
E	3.10	3.30	3.50	0.122	0.130	0.138	M	*	*	0.15	*	*	0.006

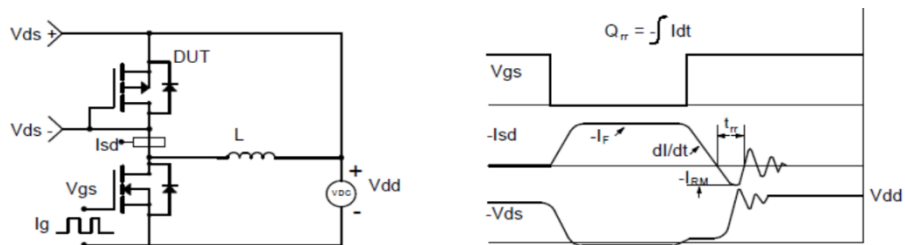
Avalanche Test Circuit and Waveforms



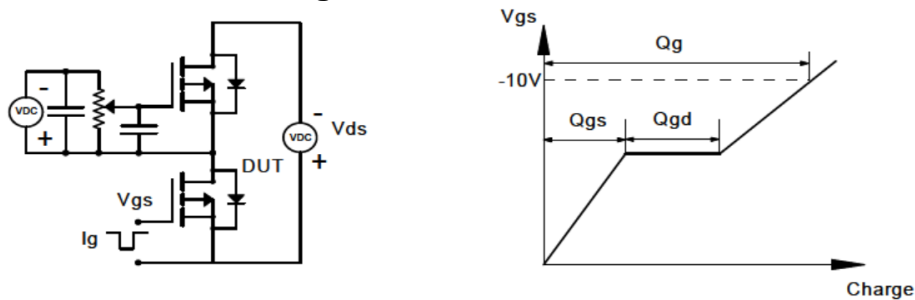
Switching Time Test Circuit and Waveforms



Diode Recovery Test Circuit and Waveforms



Gate Charge Test Circuit and Waveform



Customer Service

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