

### Features

- 40V/22A,  
 $R_{DS(ON)} = 13m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)} = 21m\Omega(Typ.)@V_{GS}=4.5V$
- Excellent  $Q_G \times R_{DS(on)}$  product(FOM)
- SGT Technology
- Fast Switching Speed
- 100% avalanche tested

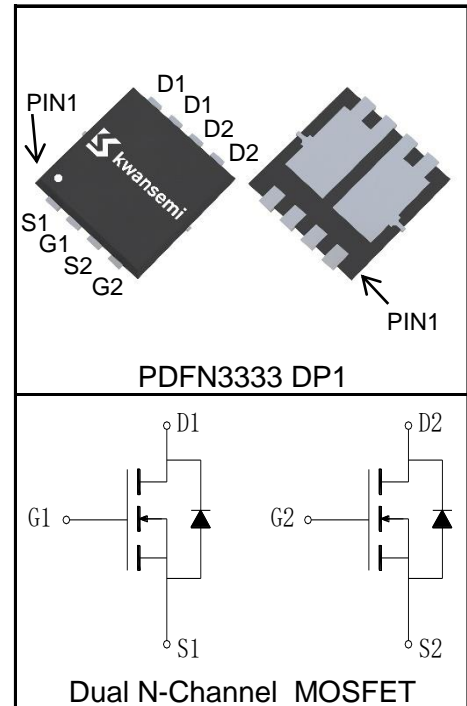
### Applications

- Switching Application Systems



Halogen-Free

### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
$V_{DSS}$	Drain-Source Voltage	40	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_{Jmax}$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 22	A	
<b>Mounted on Large Heat Sink</b>				
$I_{DP}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 88	A	
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10V)$	$T_C=25^\circ\text{C}$	A	
		$T_C=100^\circ\text{C}$		14
	Continuous Drain Current@ $T_A(V_{GS}=10V)^{③}$	$T_A=25^\circ\text{C}$		10
		$T_A=70^\circ\text{C}$		8
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ\text{C}$	W	
		$T_C=100^\circ\text{C}$		6
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ\text{C}$		2.8
		$T_A=70^\circ\text{C}$		1.8

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	9	°C/W
$R_{\theta JA}$ ③	Thermal Resistance-Junction to Ambient	45	°C/W
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}$ ④	Avalanche Energy, Single Pulsed	16	mJ

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

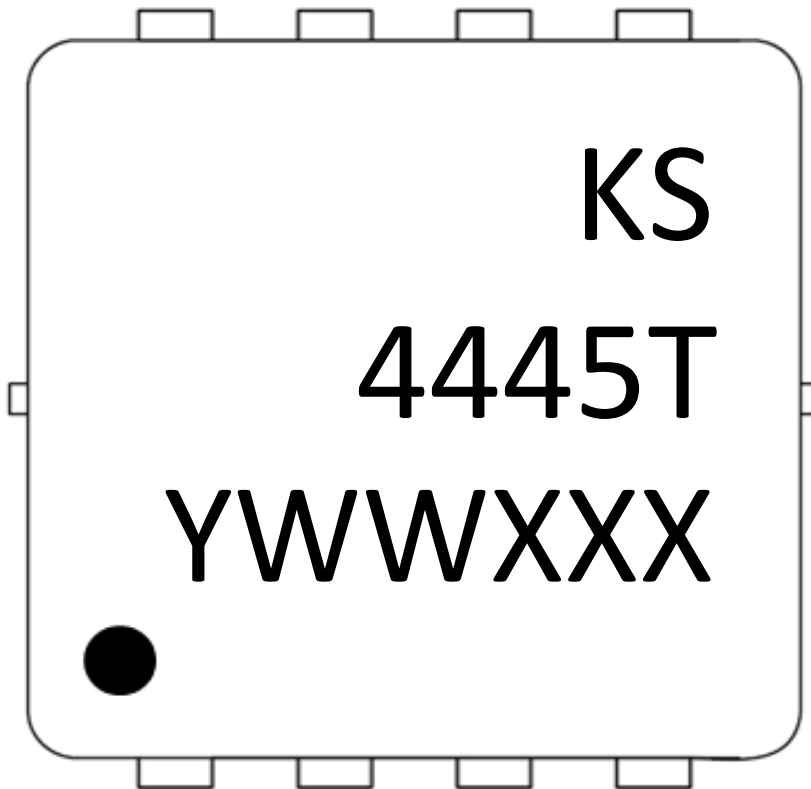
Symbol	Parameter	Test Condition	KS4445MAT			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	$\mu A$
		$T_J=125^\circ\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.7	2.3	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}$ ⑤	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=10A$		13	18	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=8A$		21	26	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}$ ⑤	Diode Forward Voltage	$I_{SD}=10A, V_{GS}=0V$		0.88	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=10A, dI_{SD}/dt=100A/\mu s$		14		ns
$Q_{rr}$	Reverse Recovery Charge			25		nC
<b>Dynamic Characteristics</b> ⑥						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	1.5	5	10	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=20V, \text{Frequency}=1.0\text{MHz}$	195	340	595	pF
$C_{oss}$	Output Capacitance		40	70	125	
$C_{rss}$	Reverse Transfer Capacitance		30	60	105	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, I_{DS}=10A, V_{GS}=10V, R_G=3\Omega$		7		ns
$t_r$	Turn-on Rise Time			10		
$t_{d(OFF)}$	Turn-off Delay Time			17		
$t_f$	Turn-off Fall Time			11		
<b>Gate Charge Characteristics</b> ⑥						
$Q_g$	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V, I_{DS}=10A$	4.8	8.5	15	nC
$Q_{gs}$	Gate-Source Charge		0.6	1.1	1.9	
$Q_{gd}$	Gate-Drain Charge		1.6	2.9	5	

**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  $T_{J\text{max}}$ , Starting  $T_J = 25^\circ\text{C}$ ,  $I_{AS\text{max}} = 8\text{A}$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = 24\text{V}$ ,  $R_G = 25\Omega$ ,  $V_{GS} = 10\text{V}$ . Part not recommended for use above this value. 100% Final Test at  $I_{AS} = 4\text{A}$ ,  $L = 0.5\text{mH}$ .
- ⑤Pulse test; Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- ⑥Guaranteed by design, not subject to production testing.

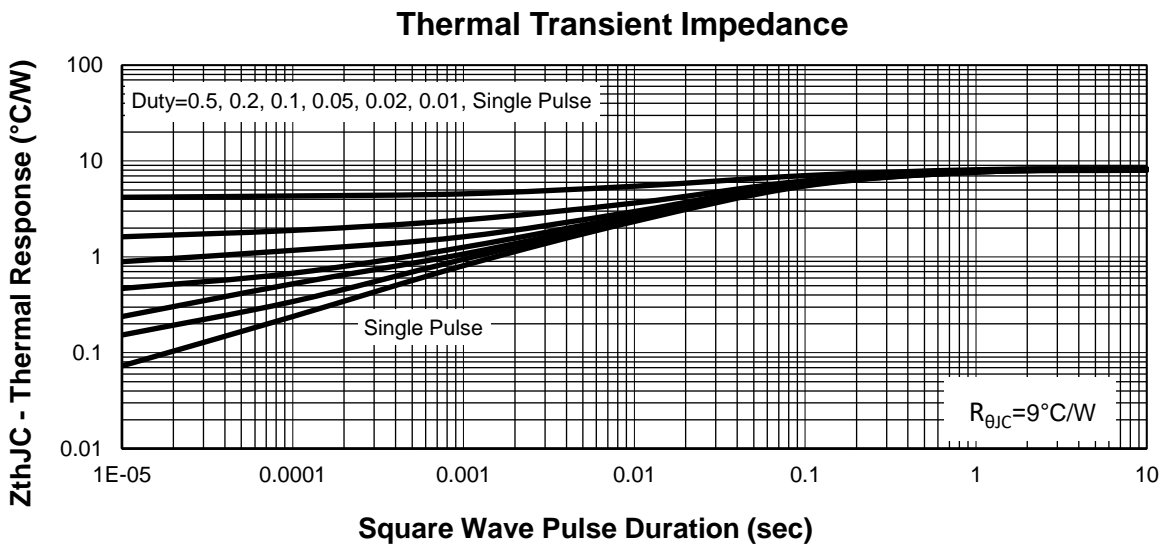
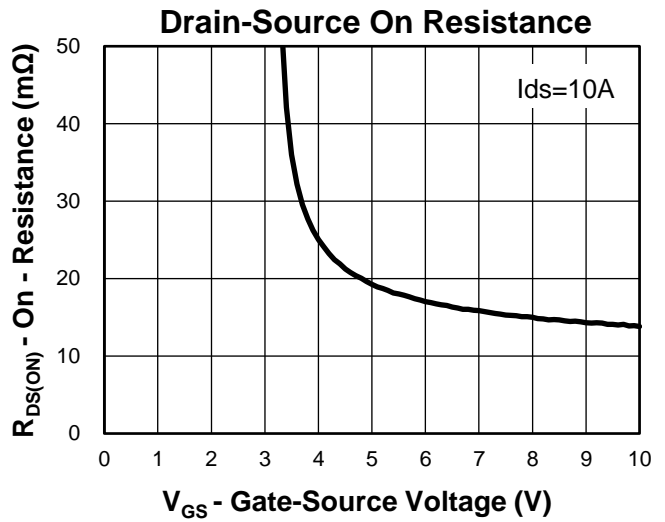
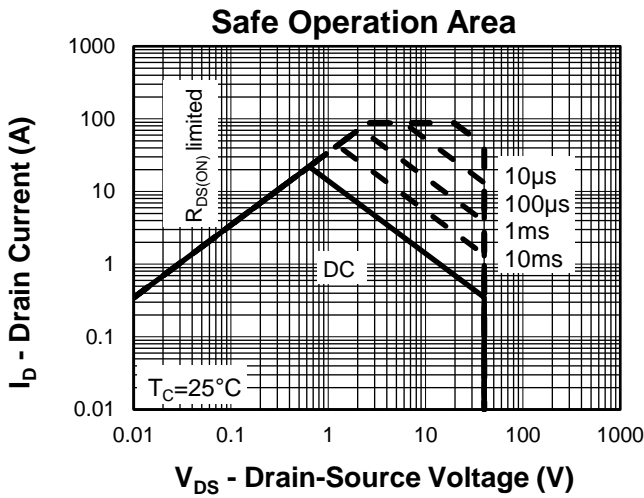
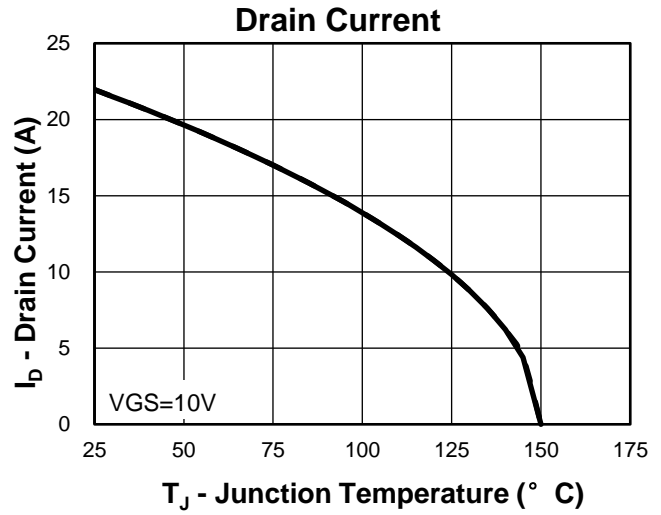
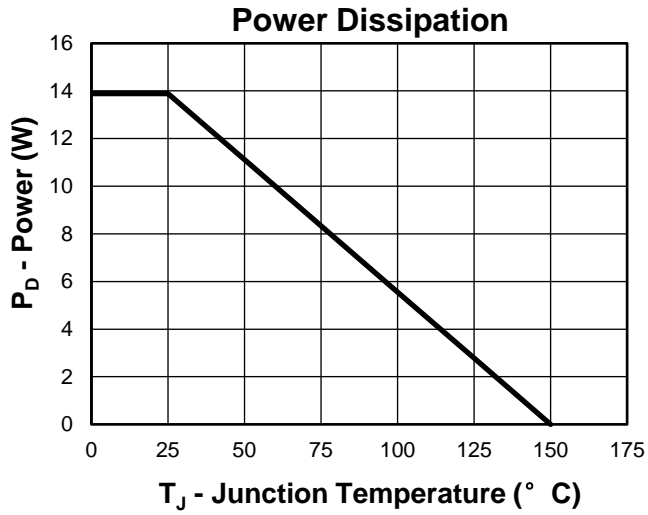
**Ordering and Marking Information**

Device	Package	Packaging	Quantity	Reel Size	Tape width
KS4445MAT	PDFN3333	Tape&Reel	5000	13"	12mm

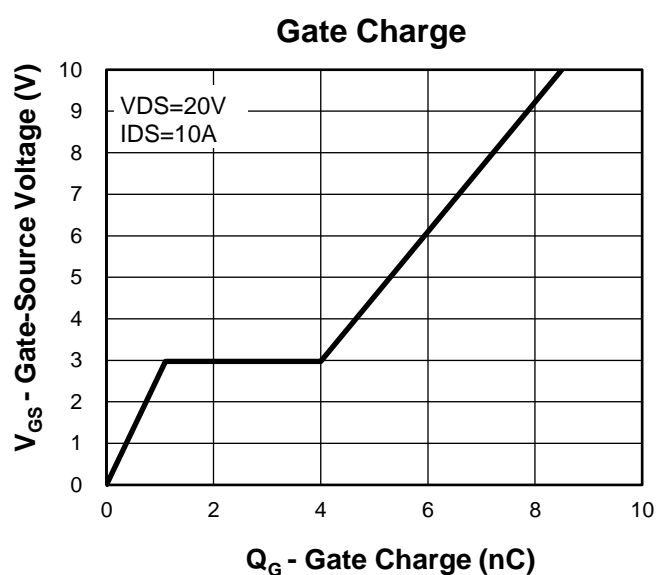
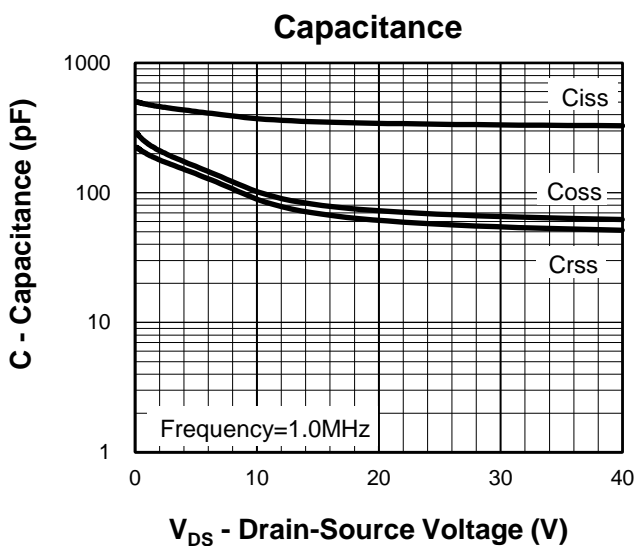
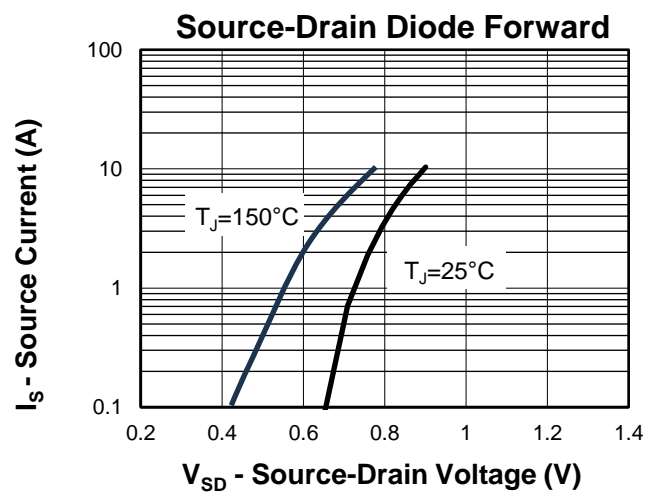
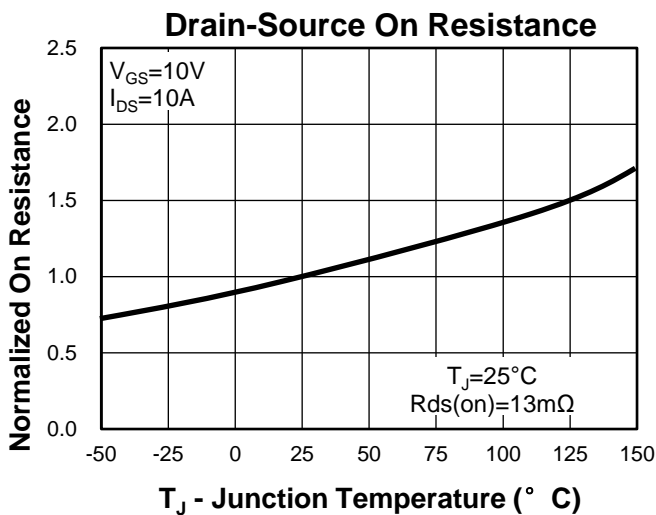
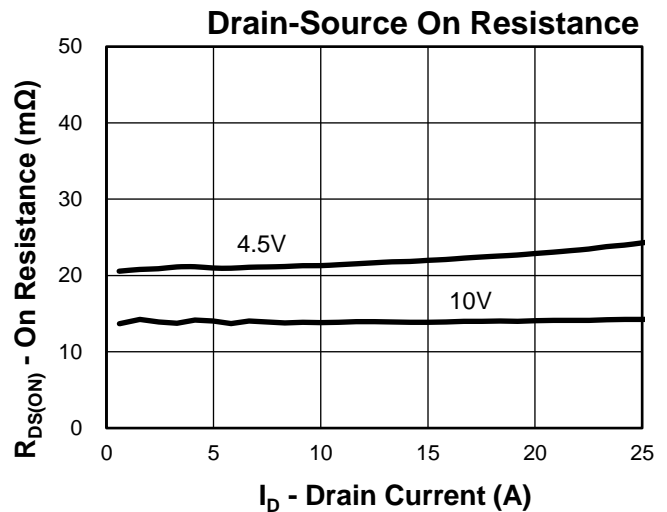
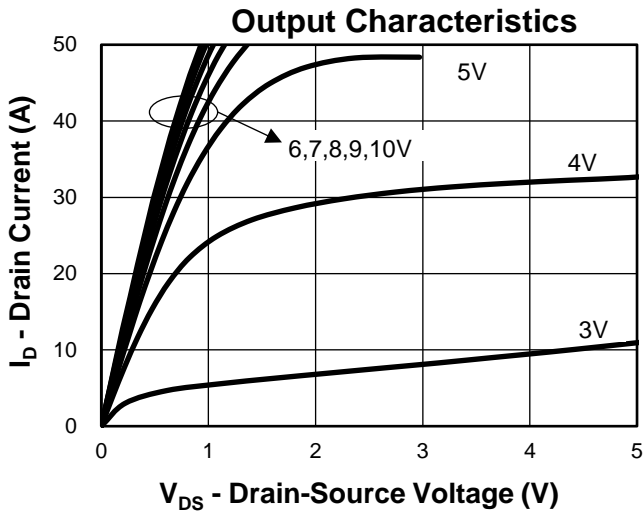


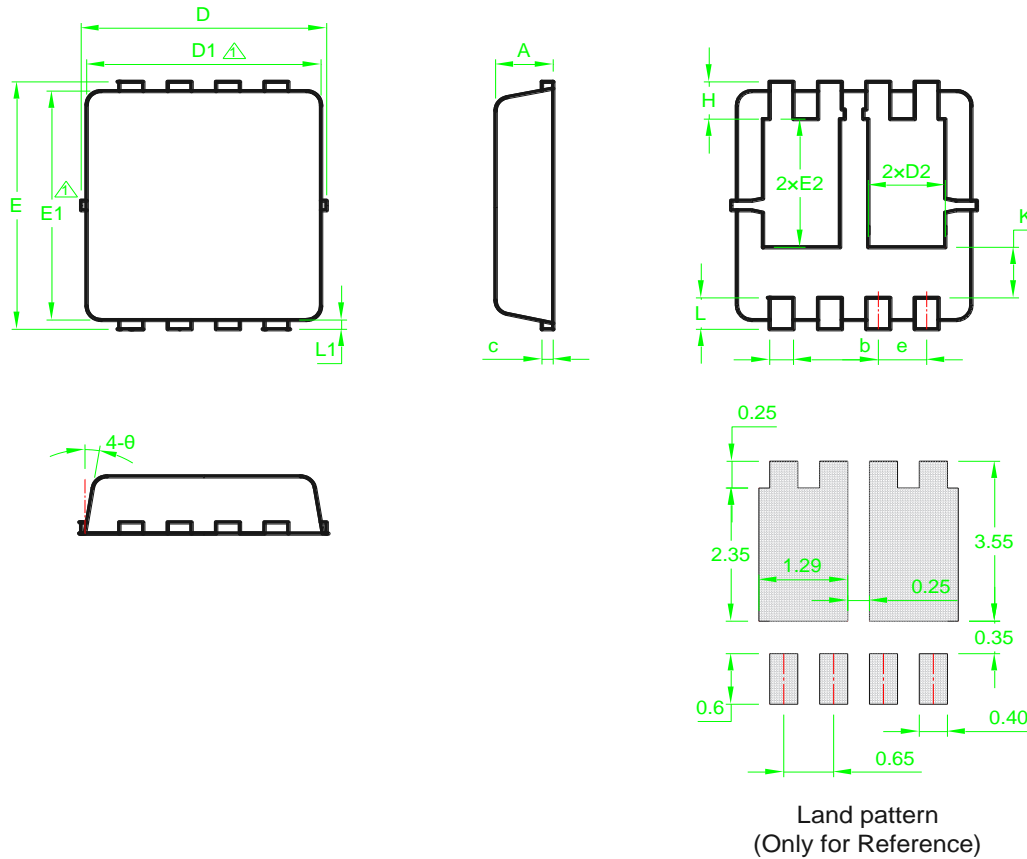
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 2nd Line: Part Number(4445T)  
 3rd Line: Lot Number(YWWXXX)

### Typical Characteristics



### Typical Characteristics

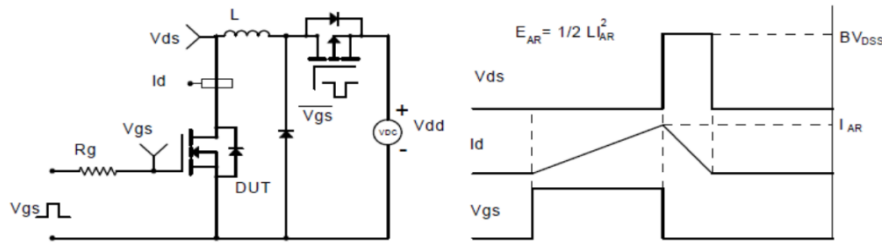


**Package Information**
**PDFN3333 DP1**


SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035	E2	1.65	*	1.95	0.065	*	0.077
b	0.25	0.30	0.35	0.010	0.012	0.014	e	0.65BSC			0.026BSC		
c	0.10	0.15	0.25	0.004	0.006	0.010	H	0.30	0.40	0.50	0.012	0.016	0.020
D	3.20	3.30	3.40	0.126	0.130	0.134	K	0.50	*	0.80	0.020	*	0.031
D1	3.00	3.15	3.25	0.118	0.124	0.128	L	0.30	0.40	0.50	0.012	0.016	0.020
D2	0.80	1.00	1.20	0.031	0.039	0.047	L1	0.10	0.15	0.20	0.004	0.006	0.008
E	3.20	3.30	3.40	0.126	0.130	0.134	θ	8°	*	12°	8°	*	12°
E1	2.90	3.05	3.20	0.114	0.120	0.126							

① Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

### Avalanche Test Circuit and Waveforms



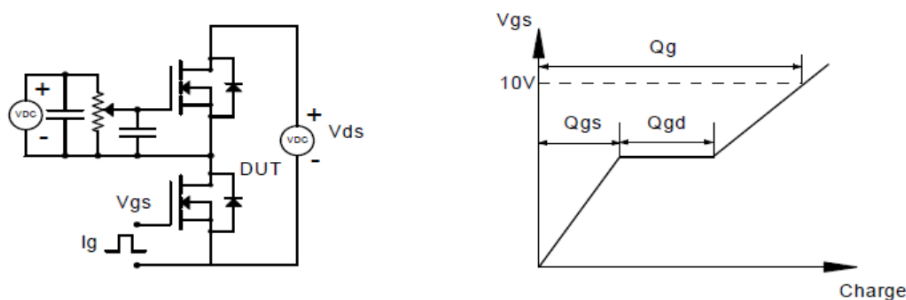
### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

Kwansemi Semiconductor Co.,Ltd

Email:Sales@kwansemi.com

Web:www.kwansemi.com

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