

## 30V N-Channel Enhancement Mode MOSFET

### Features

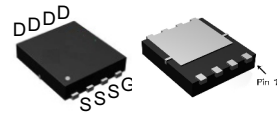
- 30V/50A,  
 $R_{DS(ON)} = 8.1m\Omega(max.) @ V_{GS} = 10V$   
 $R_{DS(ON)} = 10.7m\Omega(max.) @ V_{GS} = 4.5V$
- Provide Excellent  $Q_{gd} \times R_{DS(ON)}$
- Reliable and Rugged
- Lead Free and Green Devices Available  
(RoHS Compliant)
- 100% UIS Tested

### Applications

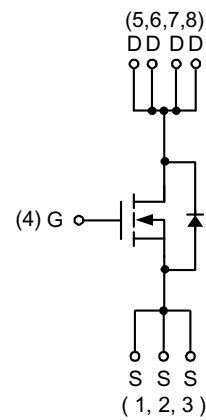
- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

### Pin Description

Top View Bottom View



DFN3x3 (punch type)



N-Channel MOSFET



## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
$V_{DSS}$	Drain-Source Voltage	30	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$I_D^a$	Continuous Drain Current ( $V_{GS}=10V$ )	$T_A=25^\circ\text{C}$	14	A
		$T_A=70^\circ\text{C}$	11.4	
$I_{DM}^a$	Pulsed Drain Current ( $V_{GS}=10V$ )	$T_A=25^\circ\text{C}$	40	
$I_D^c$	Continuous Drain Current ( $V_{GS}=10V$ )	$T_C=25^\circ\text{C}$	50	
		$T_C=70^\circ\text{C}$	37	
$I_{DM}^c$	Pulsed Drain Current ( $V_{GS}=10V$ )	$T_C=25^\circ\text{C}$	100	
$I_S^a$	Diode Continuous Forward Current	2		
$I_{AS}^b$	Avalanche Current, Single pulse	$L=0.1\text{mH}$	20	mJ
		$L=0.5\text{mH}$	14	
$E_{AS}^b$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	20	
		$L=0.5\text{mH}$	50	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150		
$P_D^a$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	2.5	W
		$T_A=70^\circ\text{C}$	1.6	
$P_D^c$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	26	W
		$T_C=70^\circ\text{C}$	17	
$R_{qJA}^a$	Thermal Resistance-Junction to Ambient	$t \geq 10\text{s}$	50	$^\circ\text{C/W}$
		Steady State	70	
$R_{qJC}^c$	Thermal Resistance-Junction to Case	Steady State	4.7	

Note a : Surface Mounted on  $1\text{in}^2$  pad area,  $t \geq 10\text{sec}$ .

Note b : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J=25^\circ\text{C}$ ).

Note c : The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 150^\circ\text{C}$ , and it is useful for reducing junction-to-case thermal resistance ( $R_{qJC}$ ) when additional heat sink is used.



## Electrical Characteristics (T<sub>A</sub> = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250mA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	1	mA
		T <sub>J</sub> =85°C	-	-	30	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250mA	1.5	1.8	2.5	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)</sub> <sup>d</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =15A	-	5.0	8.1	mΩ
		T <sub>J</sub> =125°C	-	11.7	-	
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =10A	-	7.2	10.7	
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>d</sup>	Diode Forward Voltage	I <sub>SD</sub> =2A, V <sub>GS</sub> =0V	-	0.75	1.1	V
t <sub>rr</sub> <sup>e</sup>	Reverse Recovery Time	I <sub>SD</sub> =15A, dI <sub>SD</sub> /dt=100A/ms	-	15	-	ns
t <sub>a</sub>	Charge Time		-	9	-	
t <sub>b</sub>	Discharge Time		-	6	-	
Q <sub>rr</sub> <sup>e</sup>	Reverse Recovery Charge		-	7	-	
<b>Dynamic Characteristics<sup>e</sup></b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	0.7	1	1.5	W
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz	1000	1200	1400	pF
C <sub>OSS</sub>	Output Capacitance		150	185	220	
C <sub>RSS</sub>	Reverse Transfer Capacitance		90	113	140	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =15V, R <sub>L</sub> =15W, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =6W	-	9	17	ns
t <sub>r</sub>	Turn-on Rise Time		-	11	23	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	29	52	
t <sub>f</sub>	Turn-off Fall Time		-	7	12	
<b>Gate Charge Characteristics<sup>e</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>DS</sub> =15A	-	20	24	nC
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A	-	10	12	
Q <sub>gth</sub>	Threshold Gate Charge		-	2.2	2.7	
Q <sub>gs</sub>	Gate-Source Charge		-	3.5	4.1	
Q <sub>gd</sub>	Gate-Drain Charge		-	4.2	4.7	

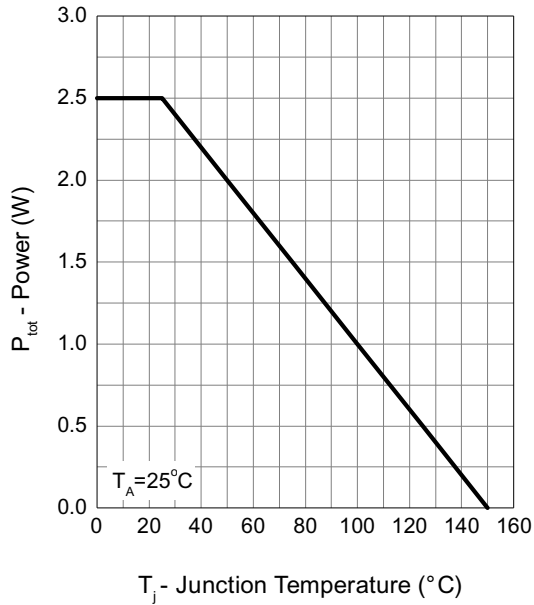
Note d : Pulse test ; pulse width ? 300 μs, duty cycle ? 2%.

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

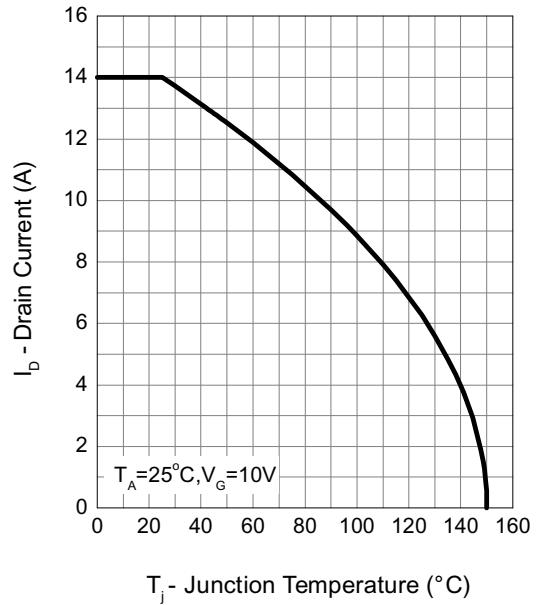


## Typical Operating Characteristics

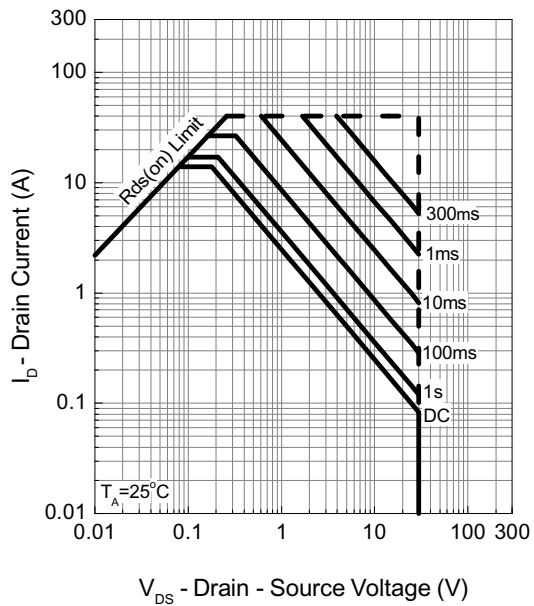
Power Dissipation



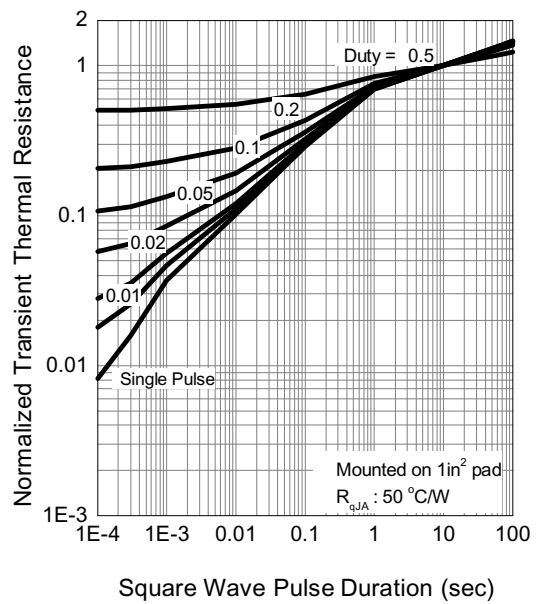
Drain Current



Safe Operation Area



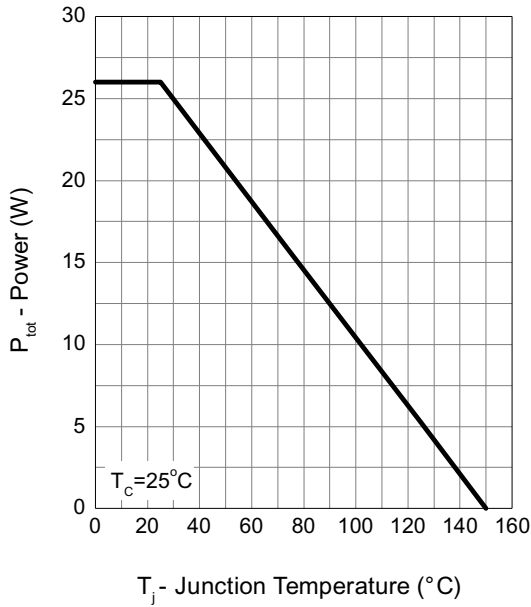
Thermal Transient Impedance



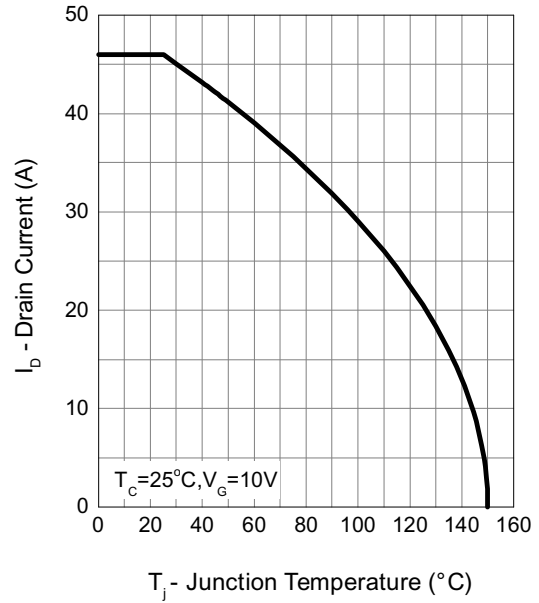


## Typical Operating Characteristics (Cont.)

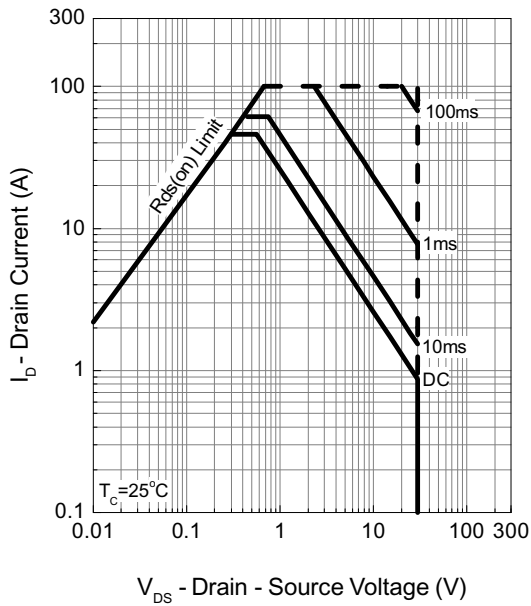
Power Dissipation



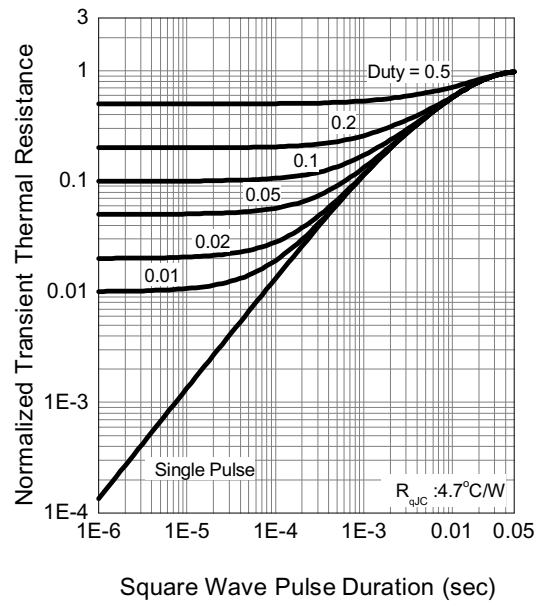
Drain Current



Safe Operation Area



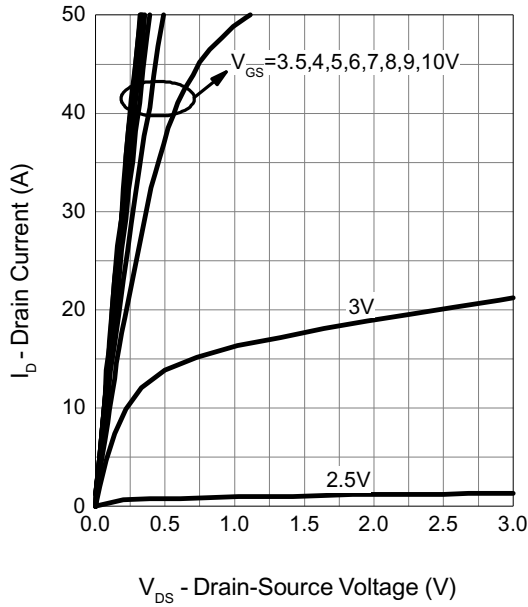
Thermal Transient Impedance



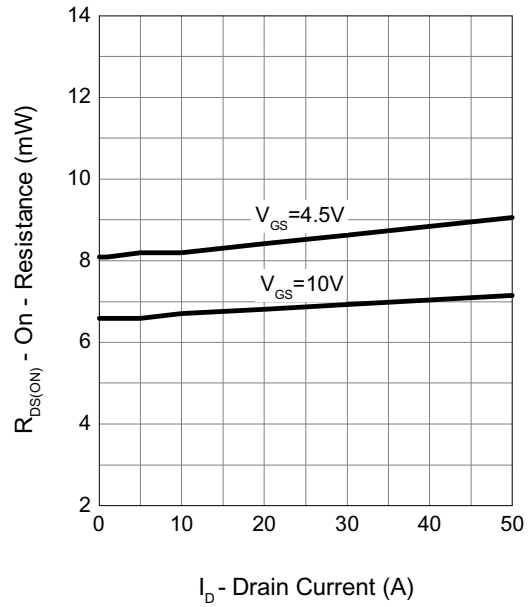


## Typical Operating Characteristics (Cont.)

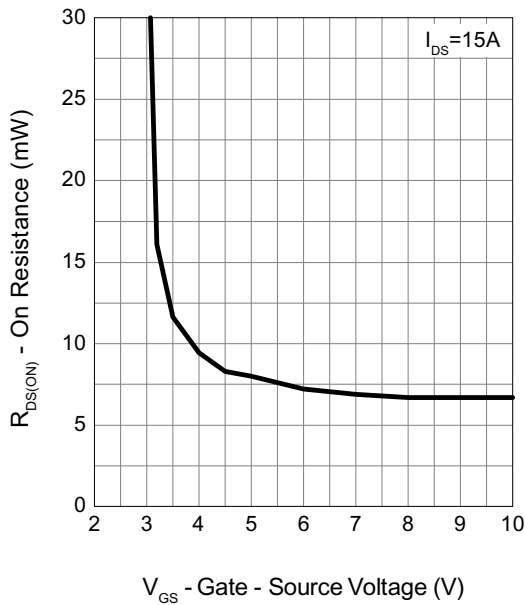
Output Characteristics



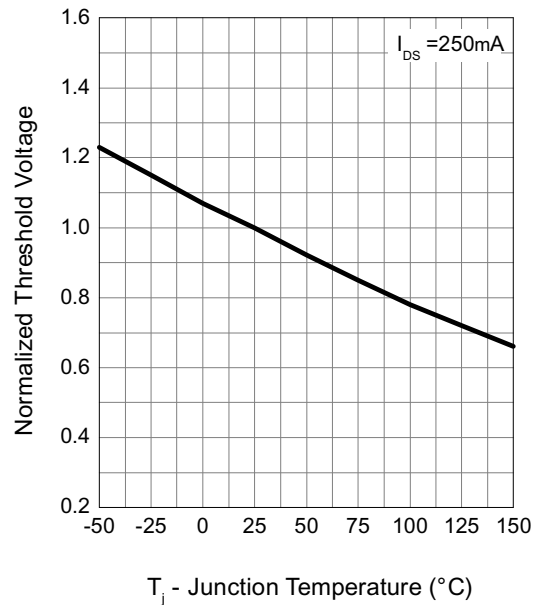
Drain-Source On Resistance



Gate-Source On Resistance



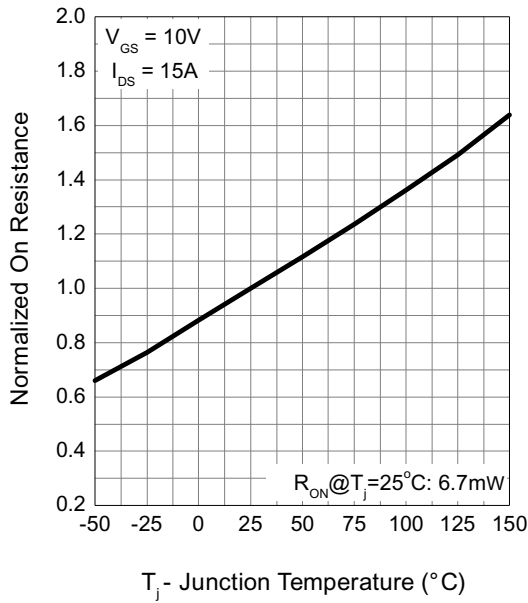
Gate Threshold Voltage



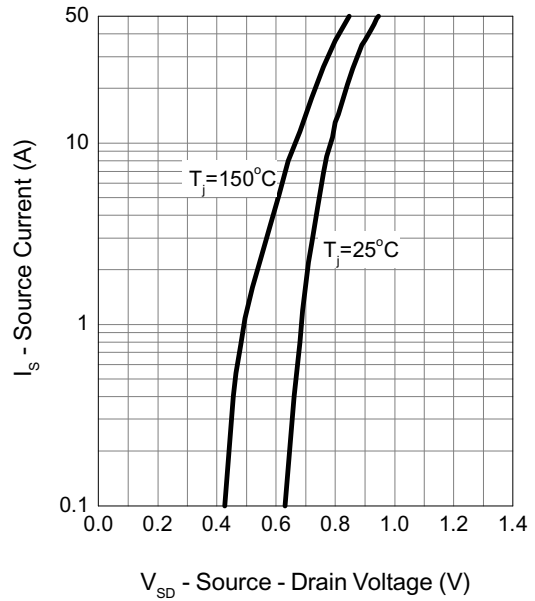


## Typical Operating Characteristics (Cont.)

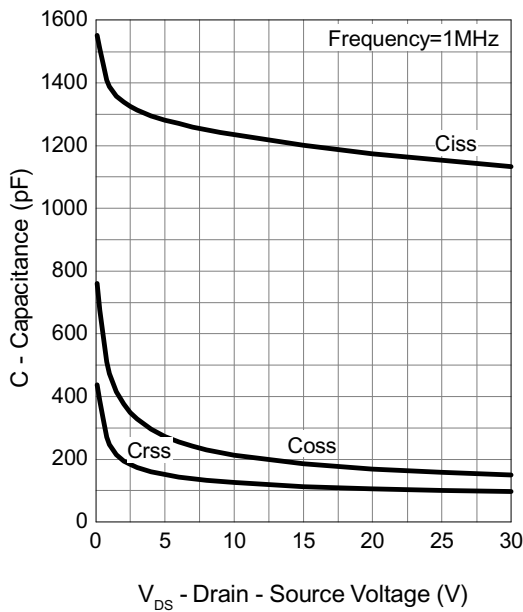
Drain-Source On Resistance



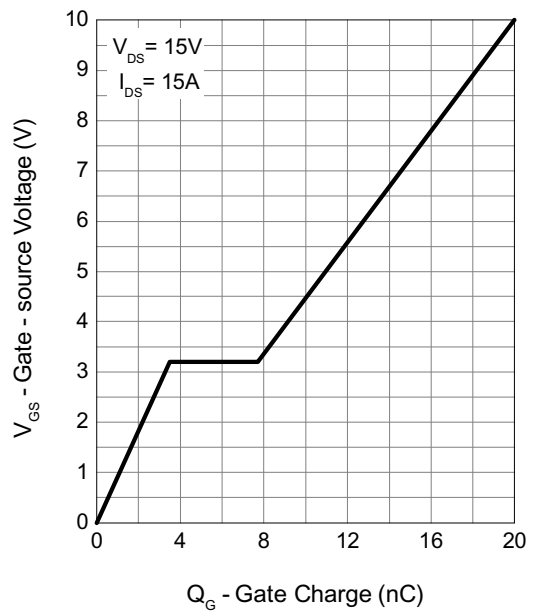
Source-Drain Diode Forward



Capacitance

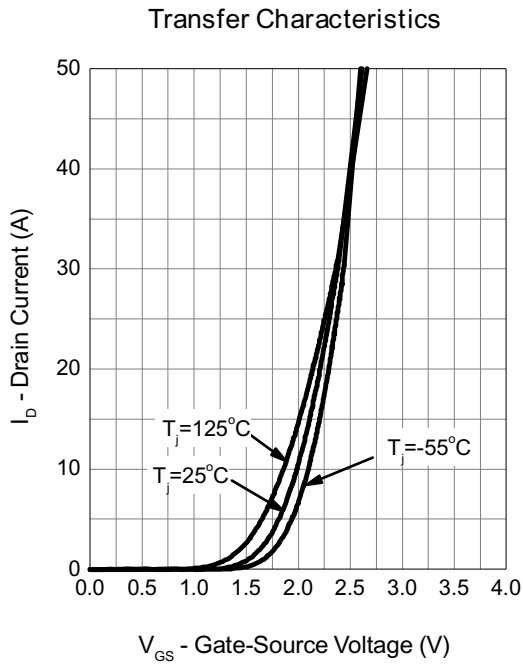


Gate Charge





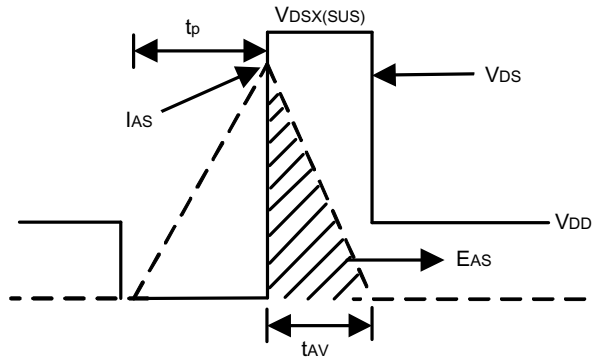
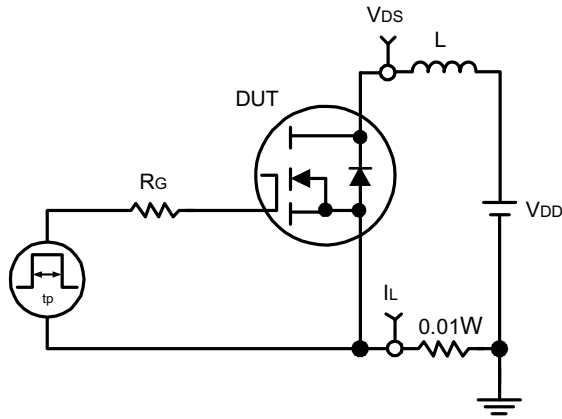
## Typical Operating Characteristics (Cont.)



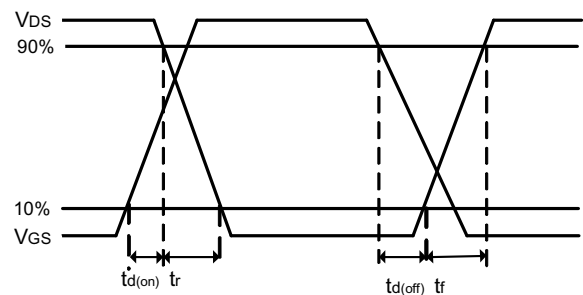
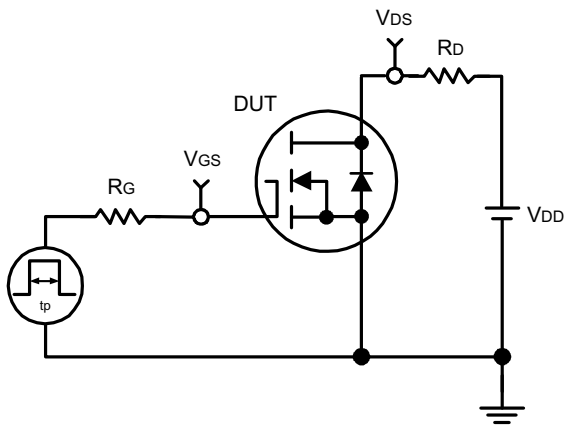




## Avalanche Test Circuit and Waveforms



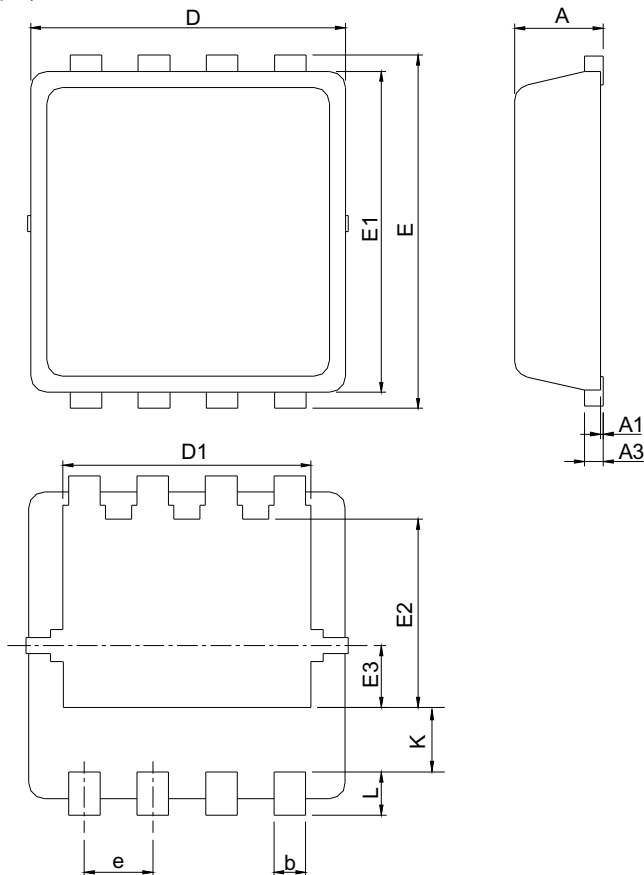
## Switching Time Test Circuit and Waveforms





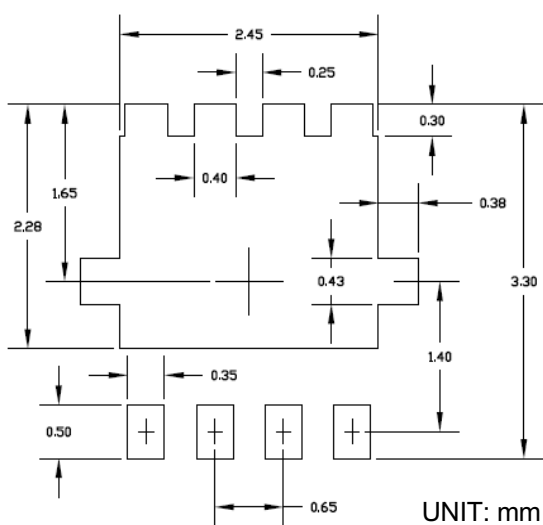
## Package Information

DFN3x3-8(punch type)



SYMBOL	DFN3x3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039
A1	0.00	0.05	0.000	0.002
A3	0.10	0.25	0.004	0.010
b	0.24	0.35	0.009	0.014
D	2.90	3.10	0.114	0.122
D1	2.25	2.45	0.089	0.096
E	3.10	3.30	0.122	0.130
E1	2.90	3.10	0.114	0.122
E2	1.65	1.85	0.065	0.073
E3	0.56	0.58	0.022	0.023
e	0.65 BSC		0.026 BSC	
K	0.475	0.775	0.019	0.031
L	0.30	0.50	0.012	0.020

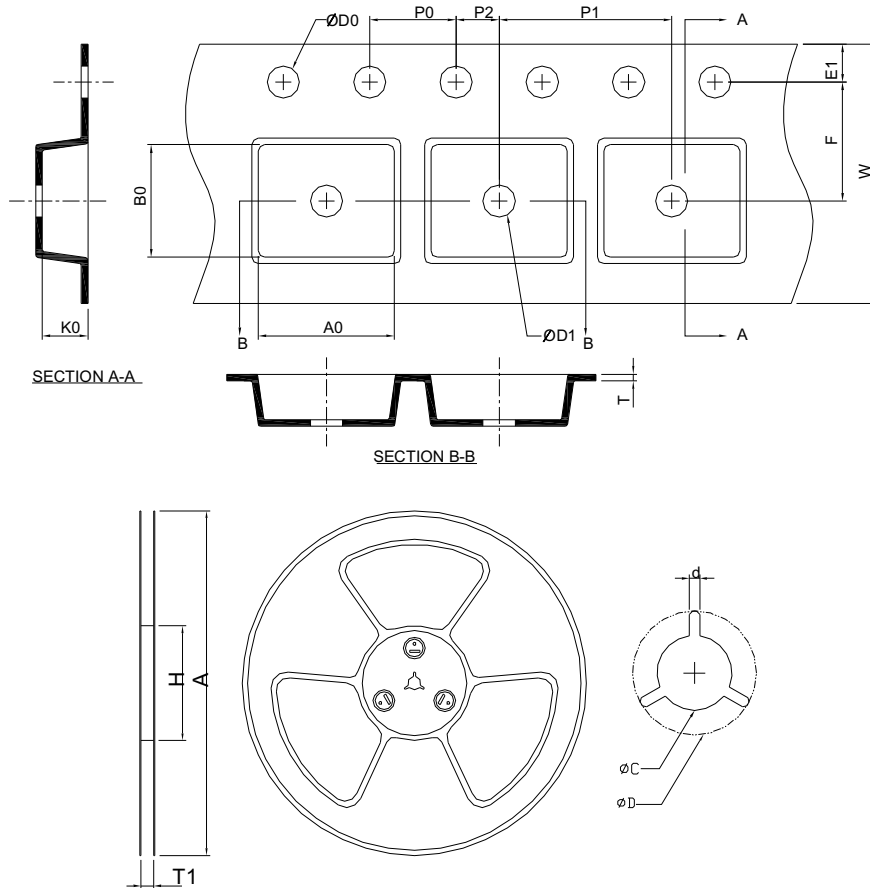
### RECOMMENDED LAND PATTERN



UNIT: mm



## Carrier Tape & Reel Dimensions



Application	A	H	T1	C	d	D	W	E1	F
DFN3x3-8 (punch type)	178.0±2.00	50 MIN.	8.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	8.0±0.20	1.75±0.10	3.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
3000PCS/Reel	4.0±0.10	8.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	3.35±0.20	3.35±0.20	1.30±0.20

(mm)