

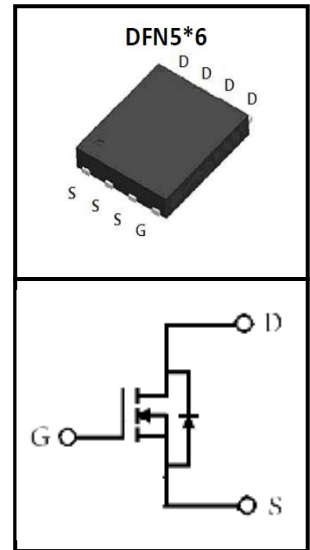
40V N-Channel Trench MOSFET

FEATURES

- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Hard switched and high frequency circuits



Device Marking and Package Information

Device	Package	Marking
CTN04N7P5	DFN5*6	CTN04N7P5

Absolute Maximum Ratings at $T_j = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	40	V
Drain Current-Continuous($T_c = 25^\circ\text{C}$) (note1)	I_D	70	A
Drain Current-Continuous($T_c = 100^\circ\text{C}$) (note1)		50	A
Pulsed Drain Current (note2)	I_{DM}	120	A
Gate Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note3)	E_{AS}	78	mJ
Power Dissipation $T_c = 25^\circ\text{C}$ (note4)	P_D	48	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ\text{C}$

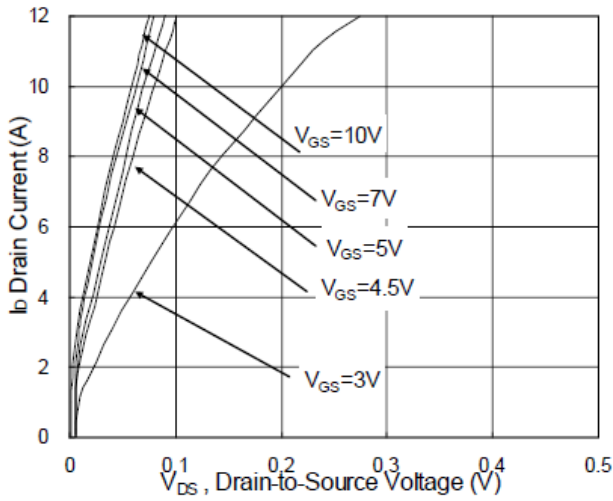
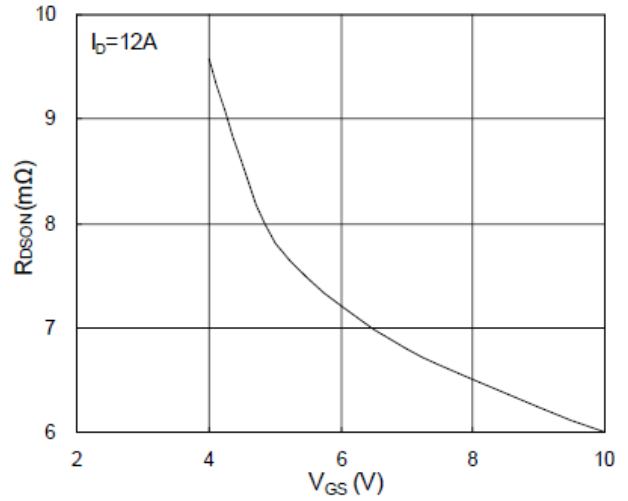
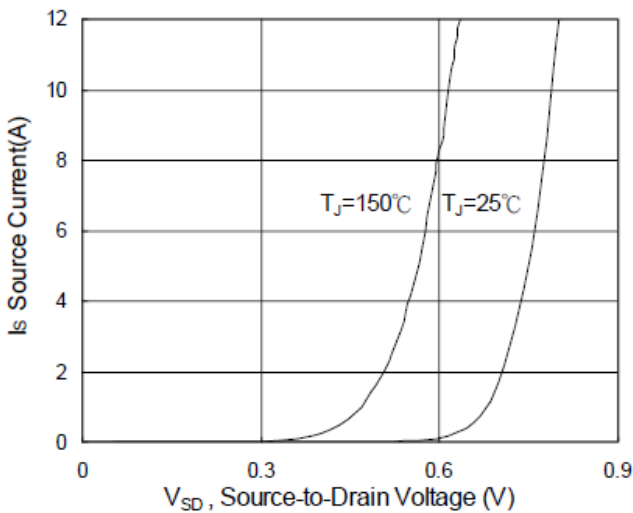
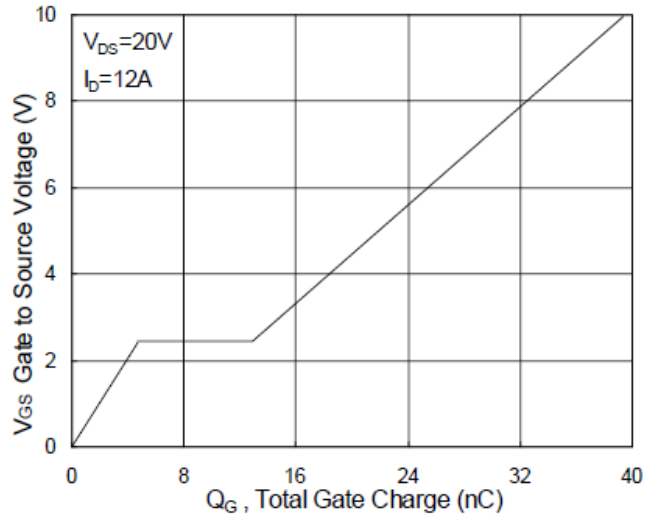
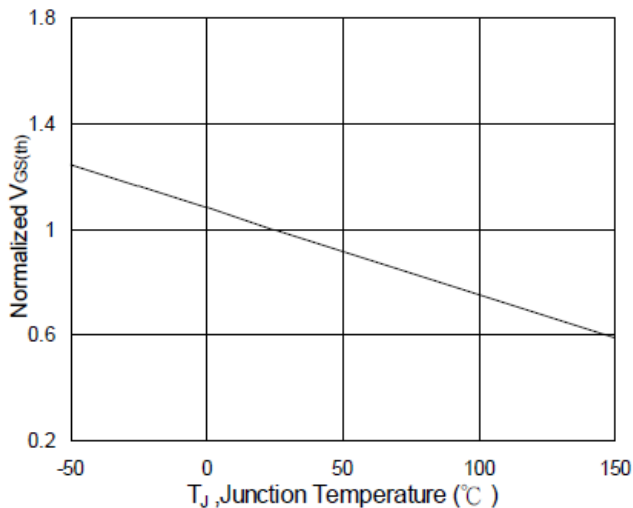
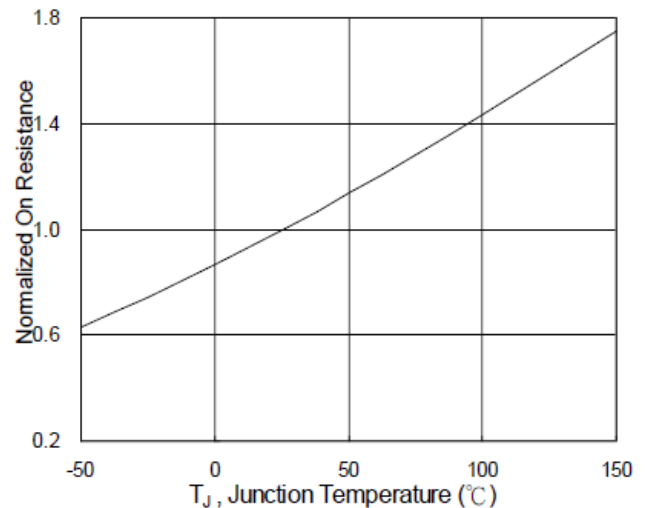
Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance,Junction-to-Ambient (note1)	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Thermal Resistance,Junction-to-Case (note1)	$R_{\theta JC}$	2.7	$^\circ\text{C/W}$

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 32V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
Zero Gate Voltage Drain Current		$V_{DS} = 32V, V_{GS} = 0V, T_J = 55^\circ\text{C}$	--	--	5	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	1.5	2.5	V
Drain-Source On-Resistance (note2)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 12A$	--	--	7.5	$m\Omega$
		$V_{GS} = 4.5V, I_D = 10A$	--	--	10	$m\Omega$
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 15V,$ $f = 1.0MHz$	--	2332	--	μF
Output Capacitance	C_{oss}		--	193	--	
Reverse Transfer Capacitance	C_{rss}		--	138	--	
Total Gate Charge (4.5V)	Q_g	$V_{DS} = 20V, I_D = 20A,$ $V_{GS} = 4.5V$	--	18.8	--	nC
Gate-Source Charge	Q_{gs}		--	4.7	--	
Gate-Drain Charge	Q_{gd}		--	8.2	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 15V, I_D = 1A$ $V_{GS} = 10V, R_G = 3.3\Omega$	--	14.3	--	ns
Turn-on Rise Time	t_r		--	2.6	--	
Turn-off Delay Time	$t_{d(off)}$		--	77	--	
Turn-off Fall Time	t_f		--	4.8	--	
Body Diode Characteristics						
Source-Drain Current(Body Diode)	I_{SD}		--	--	70	A
Pulsed Source-Drain Current(Body Diode)	I_{SDM}		--	--	50	A
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 1A, V_{GS} = 0V$	--	--	1.2	V

Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH$
4. The power dissipation is limited by 175 $^\circ\text{C}$ junction temperature
5. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Fig.1 Typical Output Characteristics

Fig.2 On-Resistance vs. G-S Voltage

Fig.3 Forward Characteristics of Reverse diode

Fig.4 Gate-Charge Characteristics

Fig.5 Normalized $V_{GS(th)}$ vs. T_J

Fig.6 Normalized $R_{DS(on)}$ vs. T_J

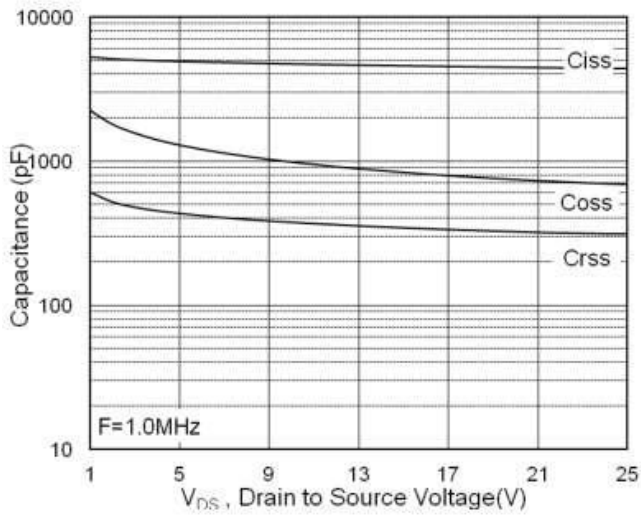
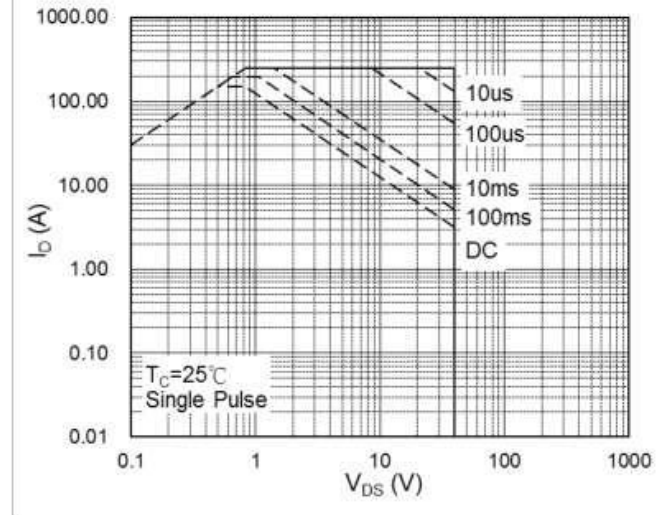
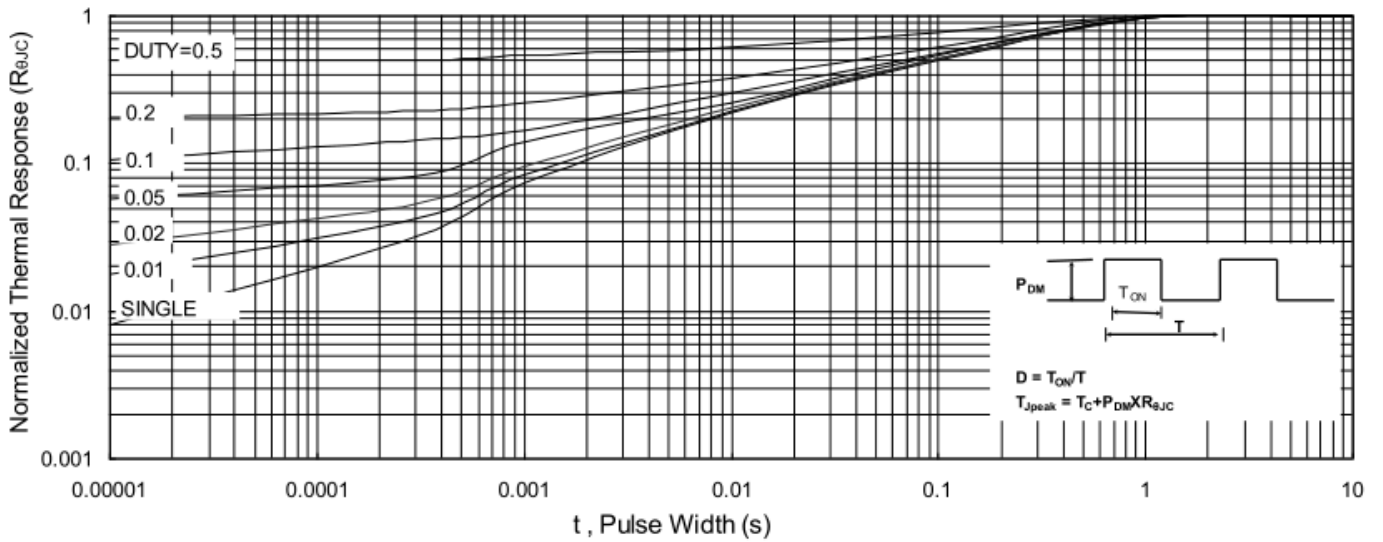
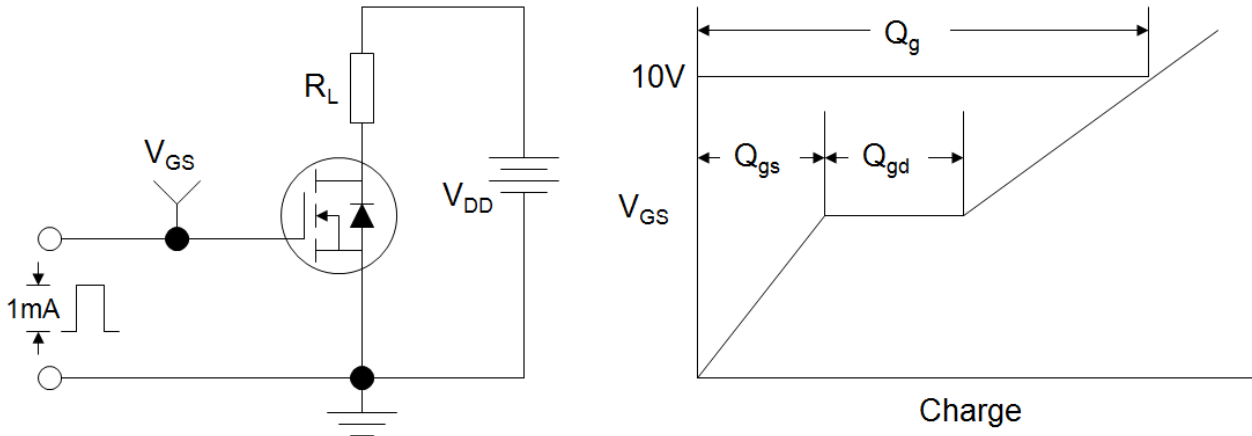
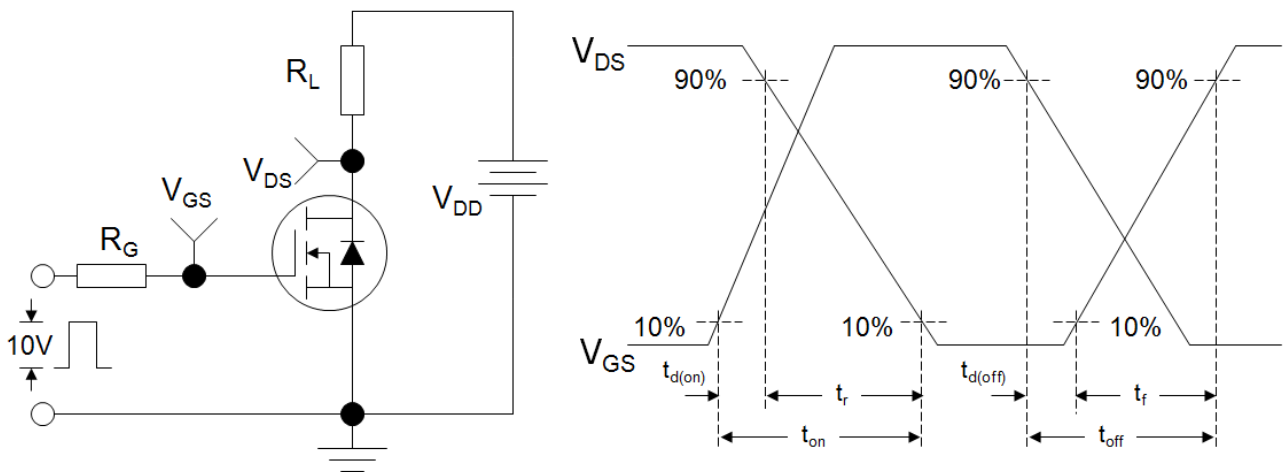
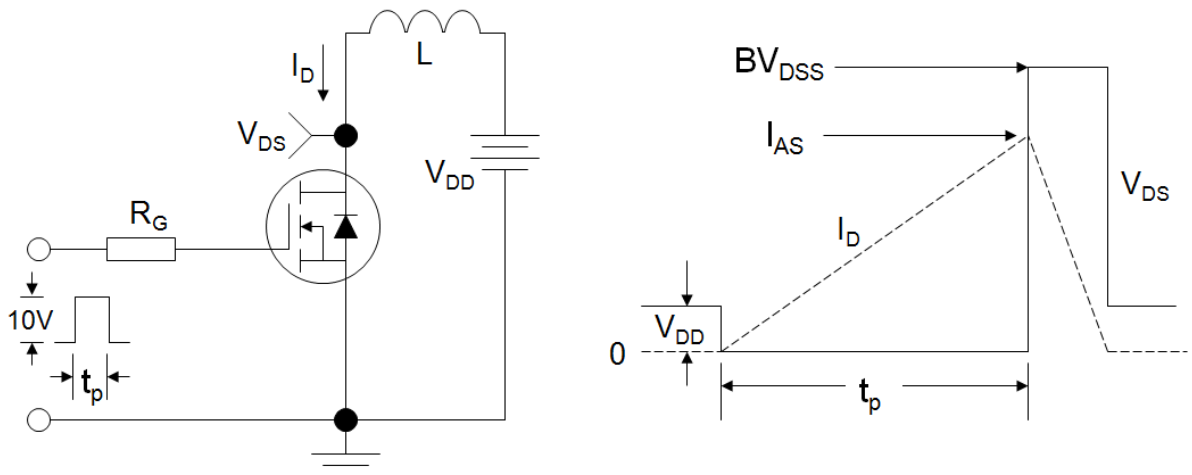
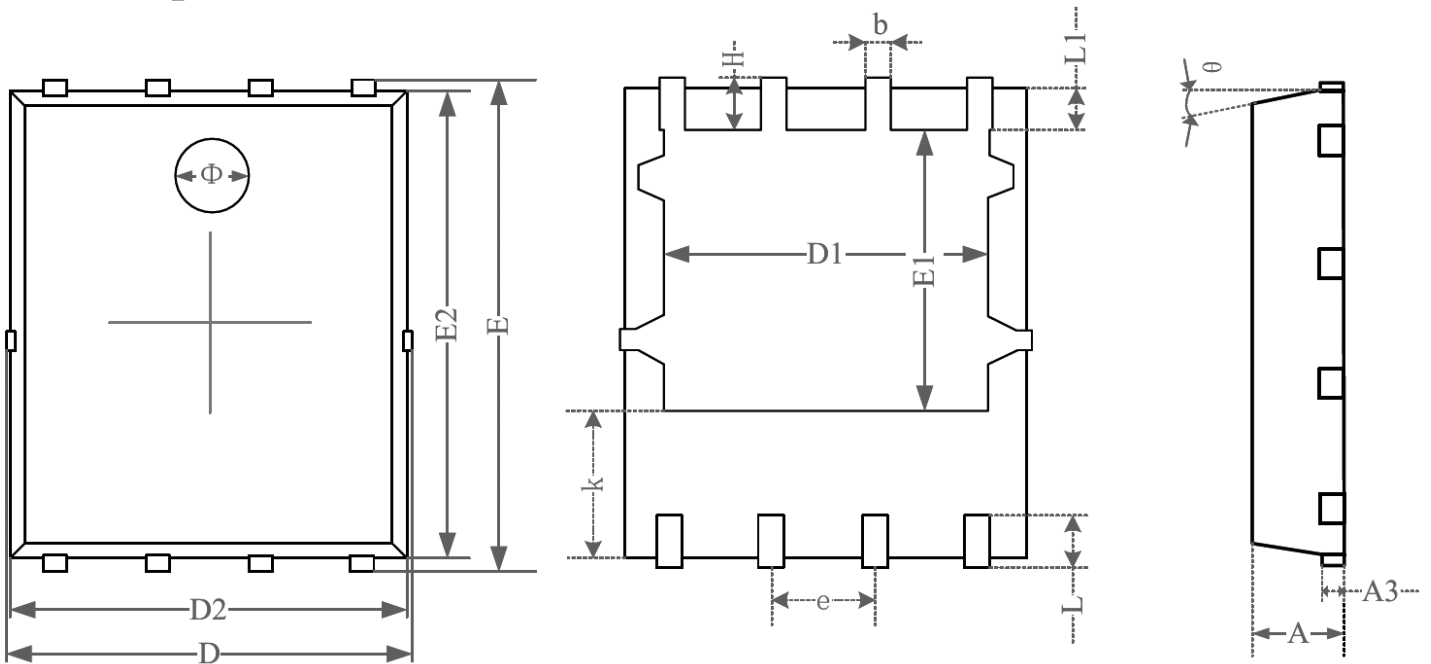
Typical Characteristics $T_J = 25^{\circ}\text{C}$, unless otherwise noted

Fig.7 Capacitance

Fig.8 Safe Operating Area

Fig.9 Normalized Maximum Transient Thermal Impedance

Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


DFN5*6



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.870	0.900	0.930	0.034	0.035	0.036
A3	0.152REF.			0.006REF.		
D	4.944	5.020	5.096	0.195	0.198	0.201
E	5.974	6.050	6.126	0.235	0.238	0.241
D1	3.910	4.010	4.110	0.154	0.158	0.162
E1	3.375	3.475	3.575	0.133	0.137	0.141
D2	4.870	4.900	4.930	0.192	0.193	0.194
E2	5.720	5.750	5.780	0.226	0.227	0.228
k	1.190	1.290	1.390	0.047	0.051	0.055
b	0.350	0.380	0.410	0.014	0.015	0.016
e	1.270TYP.			0.050TYP.		
L	0.559	0.635	0.711	0.022	0.025	0.028
L1	0.424	0.500	0.576	0.017	0.020	0.023
H	0.574	0.650	0.726	0.023	0.026	0.029
θ	10°	11°	12°	10°	11°	12°
Φ	1.150	1.200	1.250	0.045	0.047	0.049

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