

General Description

The WSD6060DN56 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WSD6060DN56 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

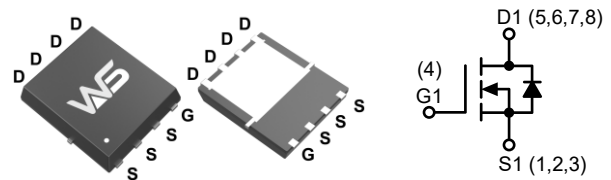
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
60V	7.5m Ω	65A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Fast switching
- Load Switch

DFN5X6-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings			
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
T_J	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$
I_S	Diode Continuous Forward Current	$T_c=25^{\circ}\text{C}$	A
I_D	Continuous Drain Current	$T_c=25^{\circ}\text{C}$	A
		$T_c=70^{\circ}\text{C}$	
I_{DM}^b	Pulse Drain Current Tested	$T_c=25^{\circ}\text{C}$	A
P_D	Maximum Power Dissipation	$T_c=25^{\circ}\text{C}$	W
		$T_c=70^{\circ}\text{C}$	
$R_{\theta JL}$	Thermal Resistance-Junction to Lead	Steady State	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	$^{\circ}\text{C/W}$
		Steady State ^b	
I_{AS}^d	Avalanche Current, Single pulse	$L=0.5\text{mH}$	A
E_{AS}^d	Avalanche Energy, Single pulse	$L=0.5\text{mH}$	mJ

Note a : Max. continuous current is limited by bonding wire.

Note b : Pulse width limited by max. junction temperature.

Note c : Surface mounted on 1in² pad area, steady state $t = 999\text{s}$.

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

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

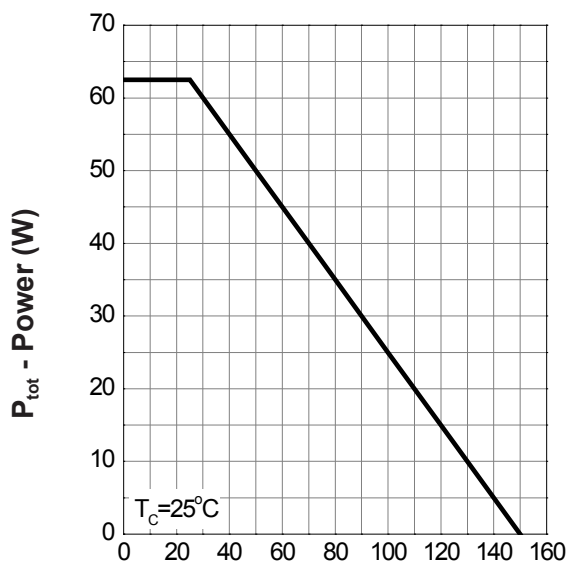
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	1.5	2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ³	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	7.5	10	m Ω
		V _{GS} =4.5V, I _{DS} =15 A	-	10	15	
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/μs	-	42	-	ns
Q _{rr}	Reverse Recovery Charge		-	36	-	nC
Dynamic Characteristics ^{3,4}						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	1.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, F=1.0MHz Ω	-	1340	-	pF
C _{oss}	Output Capacitance		-	270	-	
C _{rss}	Reverse Transfer Capacitance		-	40	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =30V, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω.	-	6	-	ns
t _r	Turn-on Rise Time		-	15	-	
t _{d(OFF)}	Turn-off Delay Time		-	30	-	
t _f	Turn-off Fall Time		-	33	-	
Gate Charge Characteristics ^{3,4}						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =4.5V, I _{DS} =20A	-	13	-	nC
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _{DS} =20A	-	27	-	
Q _{gth}	Threshold Gate Charge		-	4.1	-	
Q _{gs}	Gate-Source Charge		-	5	-	
Q _{gd}	Gate-Drain Charge		-	4.2	-	

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=48V, V_{GS}=10V, L=0.1mH, I_{AS}=20A., R_G=25Ω Starting T_J=25
3. The data tested by pulsed , pulse width<=300us , duty cycle<=2%.
4. Essentially independent of operating temperature.

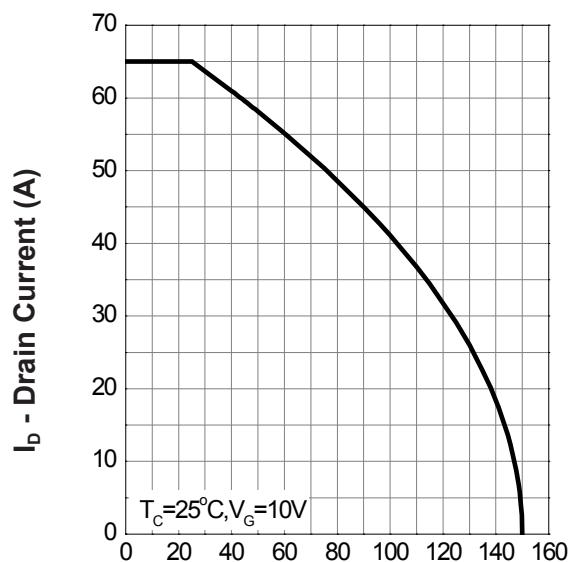
Typical Operating Characteristics

Power Dissipation



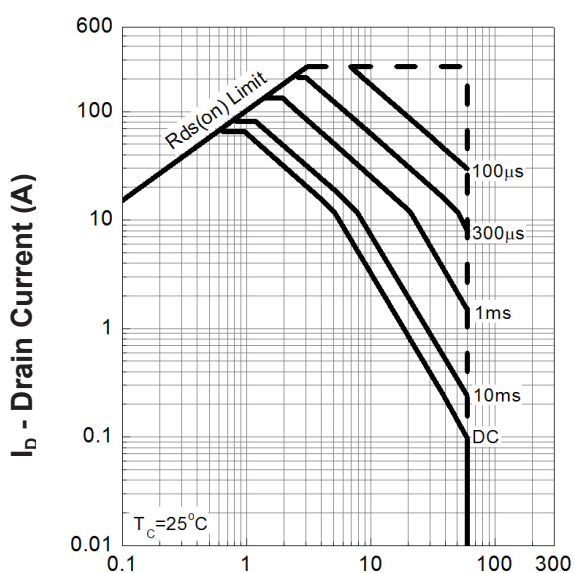
T_j - Junction Temperature ($^{\circ}\text{C}$)

Drain Current



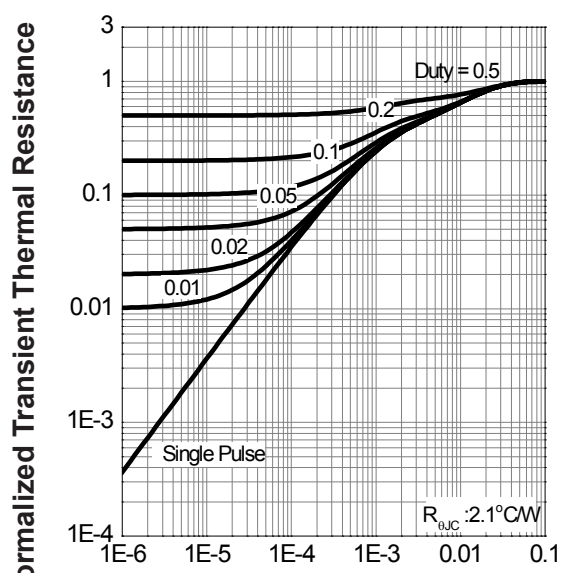
T_j - Junction Temperature ($^{\circ}\text{C}$)

Safe Operation Area



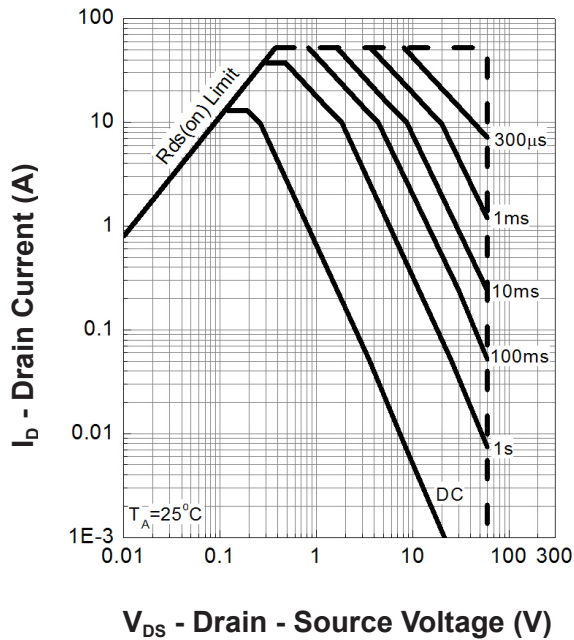
V_{DS} - Drain - Source Voltage (V)

Thermal Transient Impedance

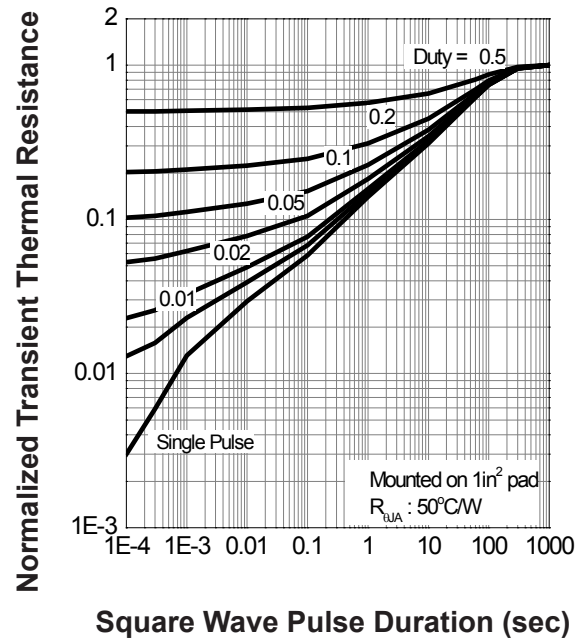


Square Wave Pulse Duration (sec)

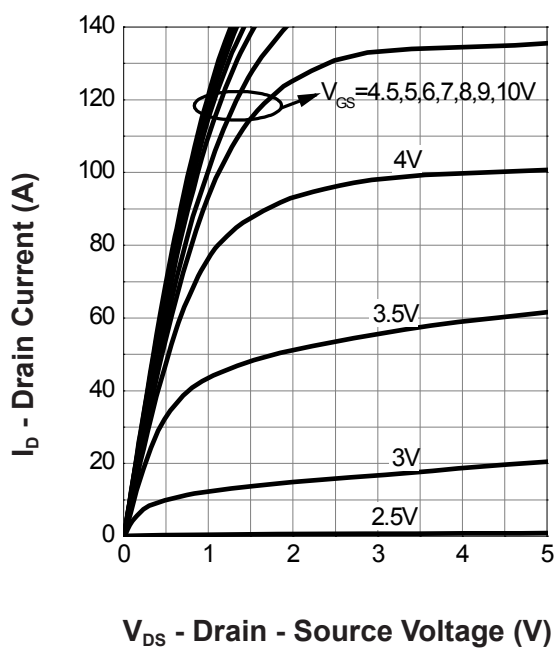
Safe Operation Area



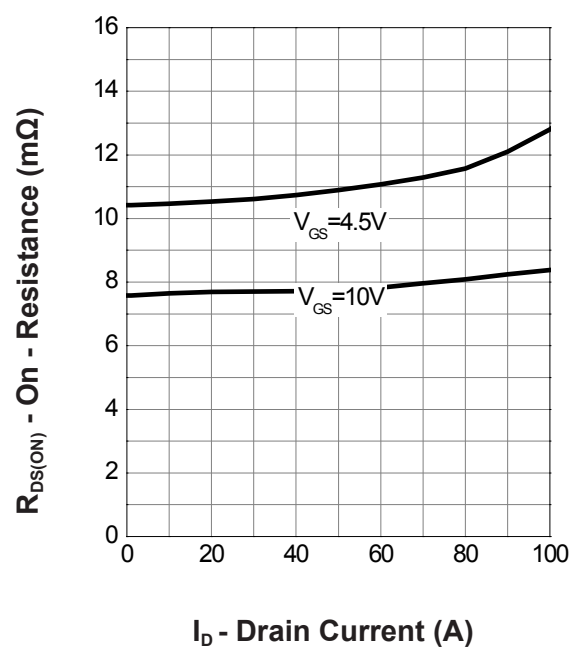
Thermal Transient Impedance



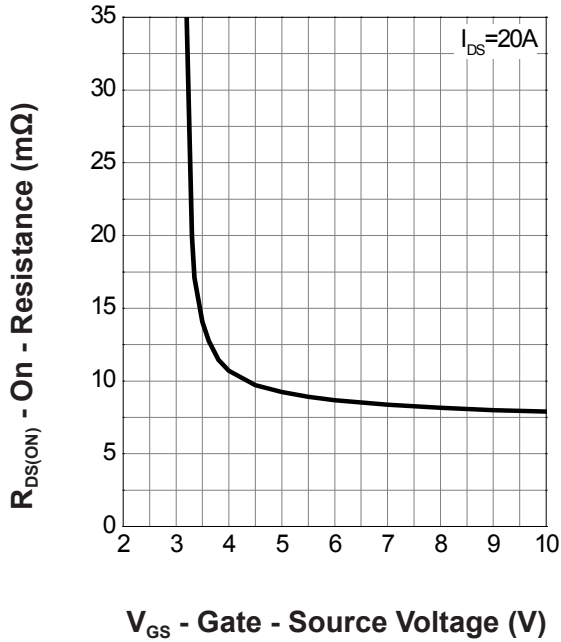
Output Characteristics



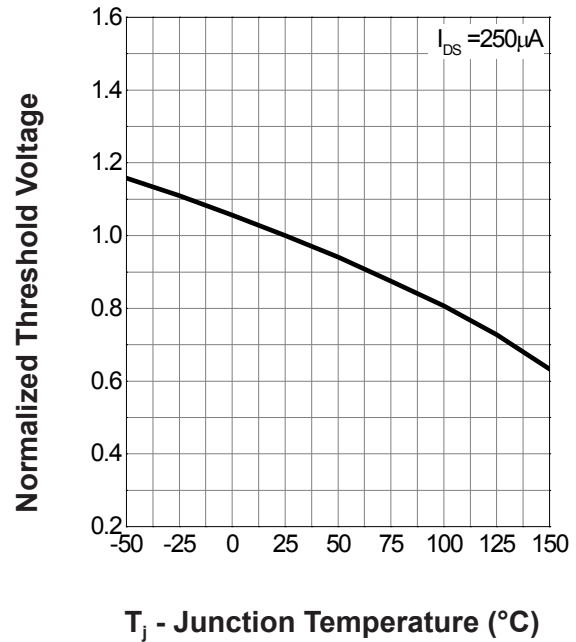
Drain-Source On Resistance



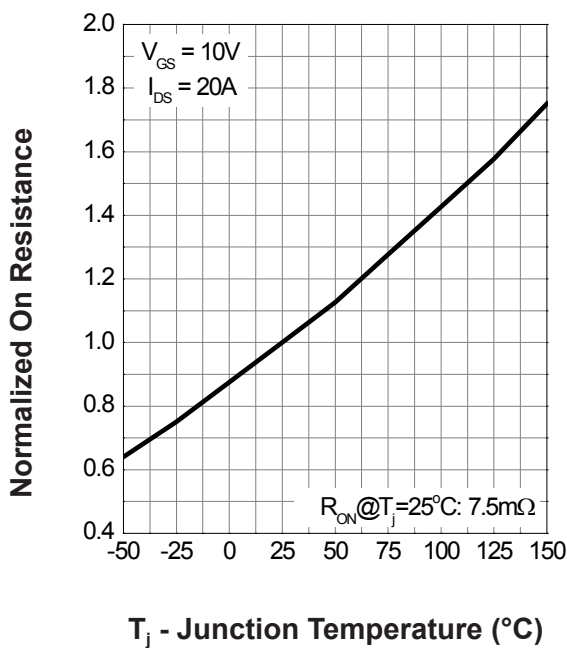
Gate-Source On Resistance



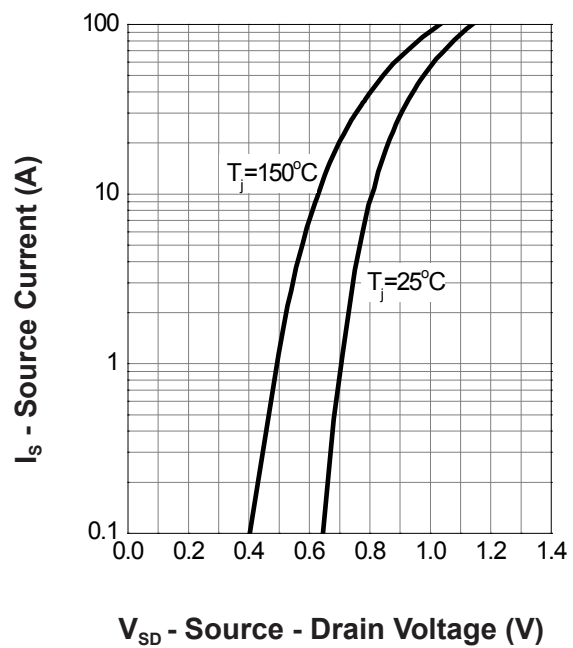
Gate Threshold Voltage



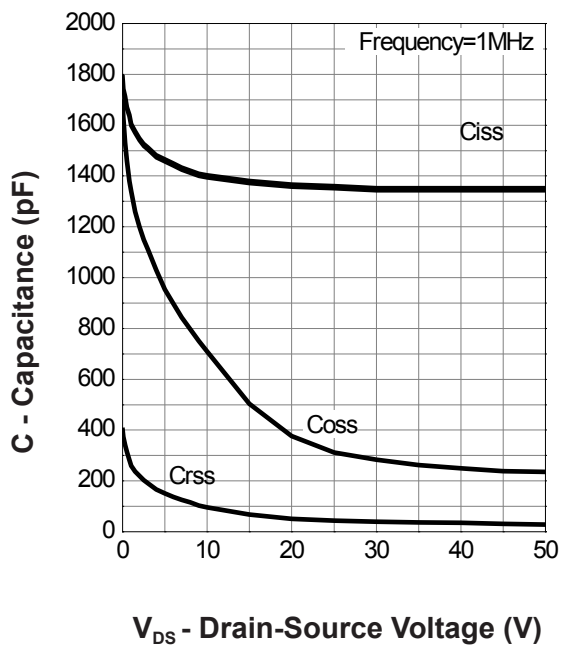
Drain-Source On Resistance



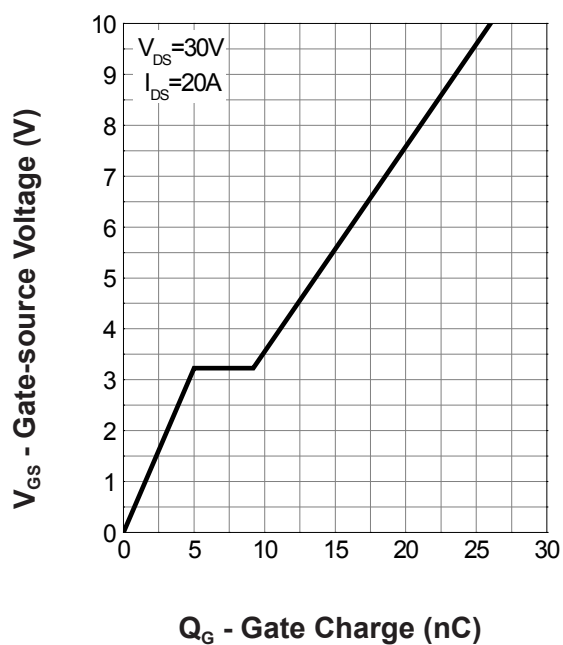
Source-Drain Diode Forward



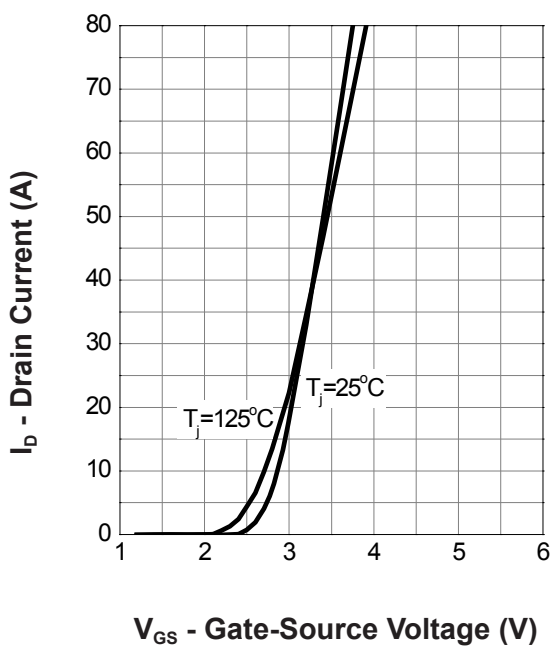
Capacitance



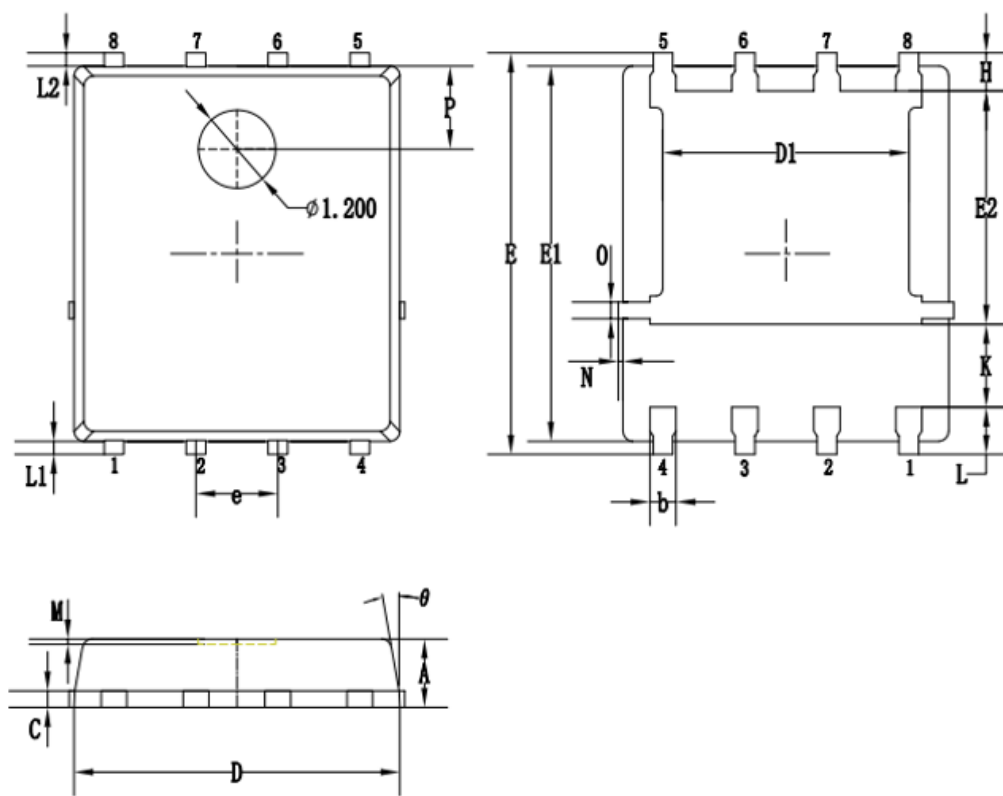
Gate Charge



Transfer Characteristics



Packaging information



SYMBOLS	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1	3.72	3.82	3.92
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		



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