

### General Description

The WSD30N10DN56T is the highest performance SGT Dual N-Channel MOSFET with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The WSD30N10DN56T meet the RoHS and Green Product requirement, 100%  $E_{AS}$  guaranteed with full function reliability approved.

### Features

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

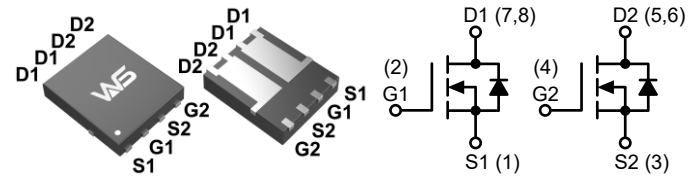
### Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
100V	70m $\Omega$	12A

### Applications

- DC-DC Converter.
- Motor Control.

### DFN5X6-8L Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	12	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	7	
$I_{DM}^1$	Pulsed Drain Current	48	
$E_{AS}^2$	Single Pulse Avalanche Energy	12	mJ
$I_{AS}^2$	Avalanche Current	7	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	31	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	

### Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}^3$	Thermal Resistance Junction-ambient	---	60	$^\circ C/W$
$R_{\theta JC}^3$	Thermal Resistance-Junction to Case	---	4.0	

**Electrical Characteristics (T<sub>J</sub>=25°C, Unless Otherwise Noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	-0.098	---	V/°C
R <sub>DS(ON)</sub> <sup>4</sup>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6A	---	70	95	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A	---	98	120	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	1.2	1.5	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-5.52	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1.0	μA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	30	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
R <sub>g</sub> <sup>5</sup>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f = 1.0MHz	---	2.5	---	Ω
Q <sub>g</sub> <sup>5</sup>	Total Gate Charge (10V)	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =5A	---	16	---	nC
Q <sub>gs</sub> <sup>5</sup>	Gate-Source Charge		---	2.8	---	
Q <sub>gd</sub> <sup>5</sup>	Gate-Drain Charge		---	3.5	---	
T <sub>d(on)</sub> <sup>5</sup>	Turn-On Delay Time	V <sub>DD</sub> =30V, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =1A, R <sub>L</sub> =30Ω	---	11	---	ns
T <sub>r</sub> <sup>5</sup>	Rise Time		---	7	---	
T <sub>d(off)</sub> <sup>5</sup>	Turn-Off Delay Time		---	28	---	
T <sub>f</sub> <sup>5</sup>	Fall Time		---	8	---	
C <sub>iss</sub> <sup>5</sup>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f = 1.0MHz	---	780	---	pF
C <sub>oss</sub> <sup>5</sup>	Output Capacitance		---	45	---	
C <sub>rss</sub> <sup>5</sup>	Reverse Transfer Capacitance		---	30	---	

**Diode Characteristics**

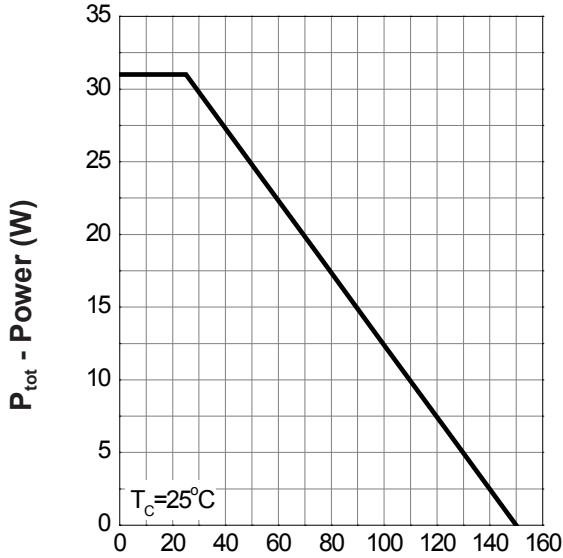
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	6	A
V <sub>SD</sub> <sup>4</sup>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =1A, di/dt=100A/μs	---	30	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	41	---	nC

**Note:**

- Pulse width limited by max. junction temperature.
- UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T<sub>J</sub>=25°C).
- Surface Mounted on 1in<sup>2</sup> pad area.
- Pulse test; pulse width≤300μs, duty cycle≤2%.
- Guaranteed by design, not subject to production testing.

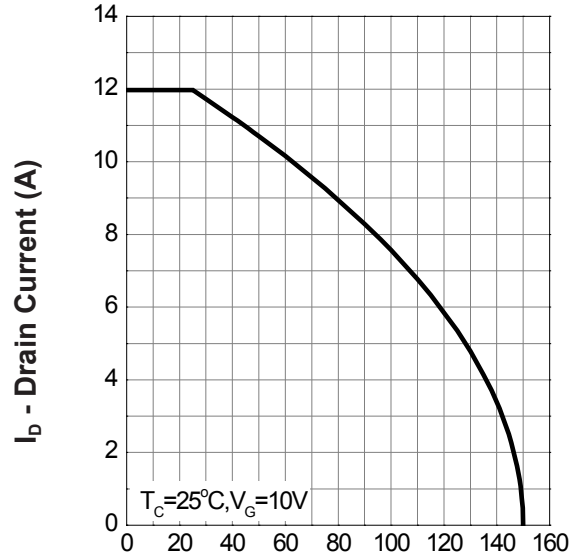
Typical Characteristics

Power Dissipation



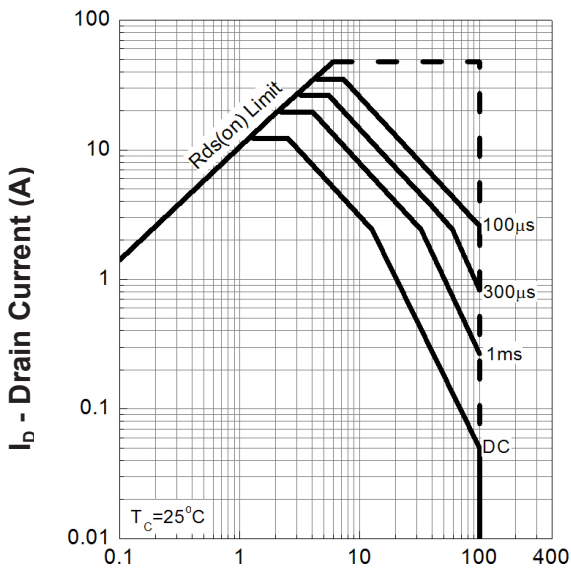
$T_j$  - Junction Temperature ( $^\circ\text{C}$ )

Drain Current



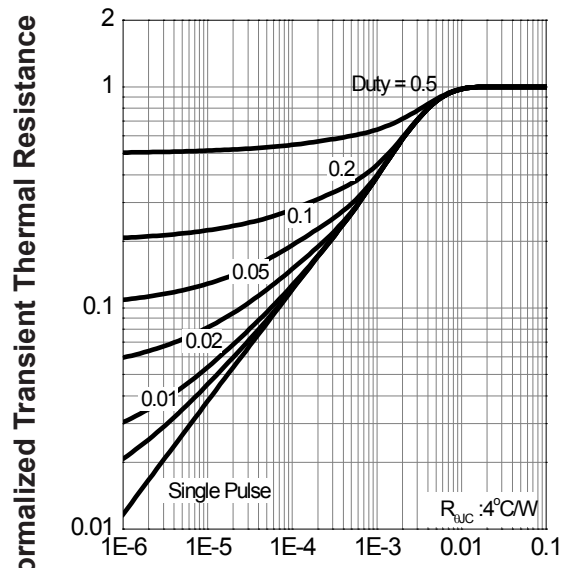
$T_j$  - Junction Temperature ( $^\circ\text{C}$ )

Safe Operation Area



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

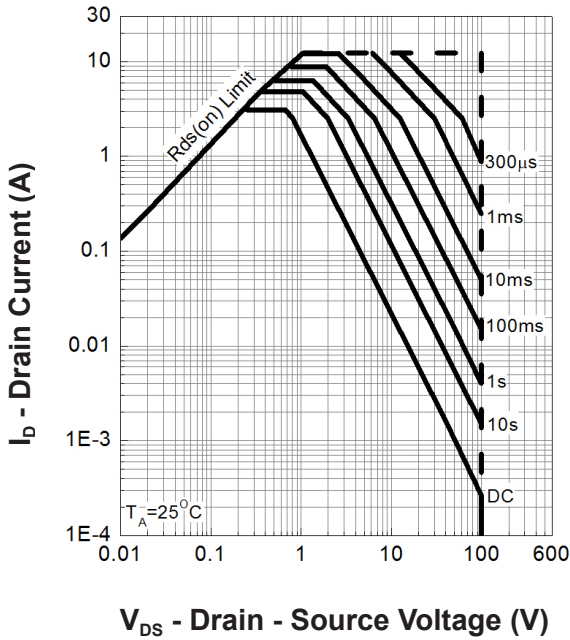
Thermal Transient Impedance



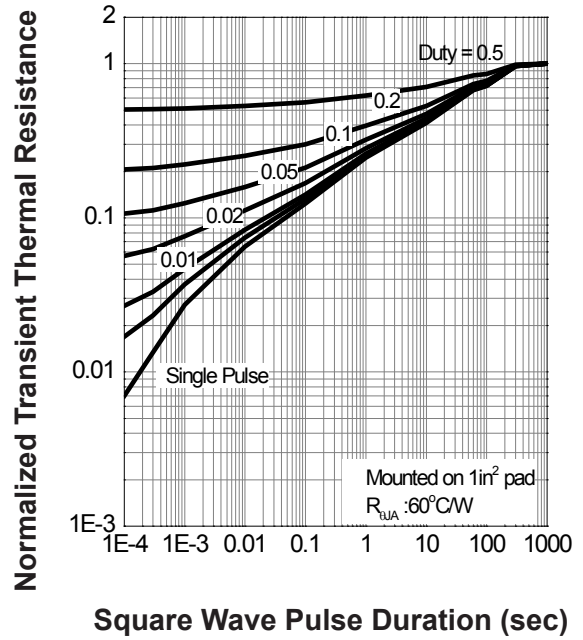
Square Wave Pulse Duration (sec)

Typical Characteristics (Cont.)

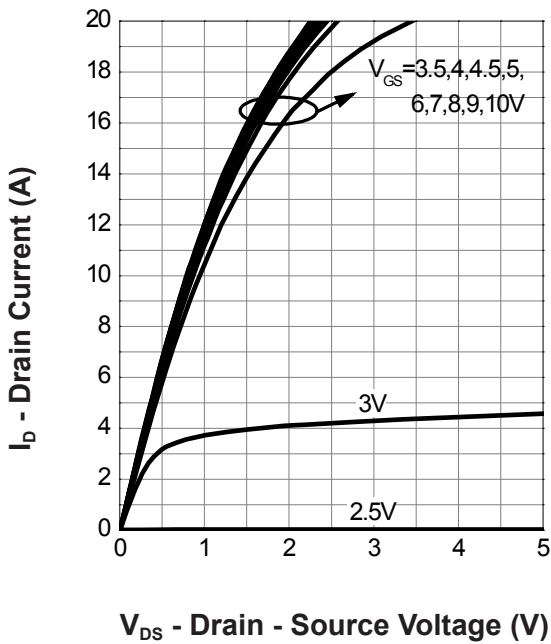
Safe Operation Area



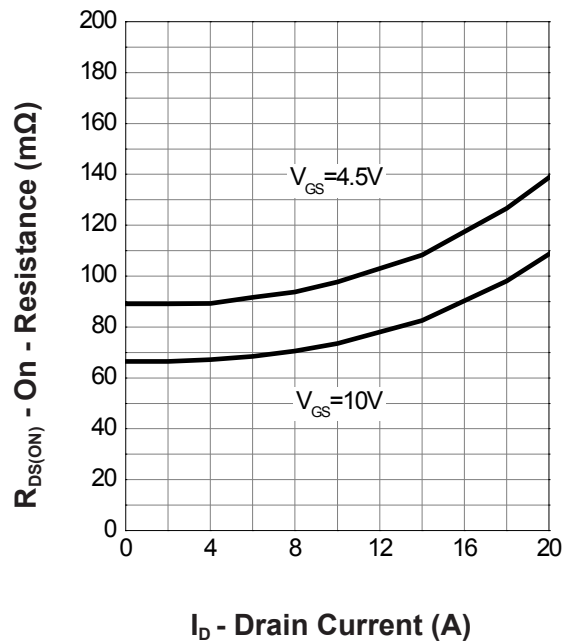
Thermal Transient Impedance



Output Characteristics

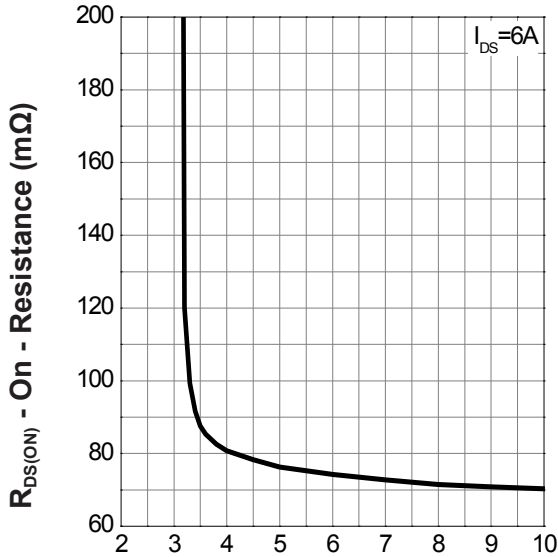


Drain-Source On Resistance



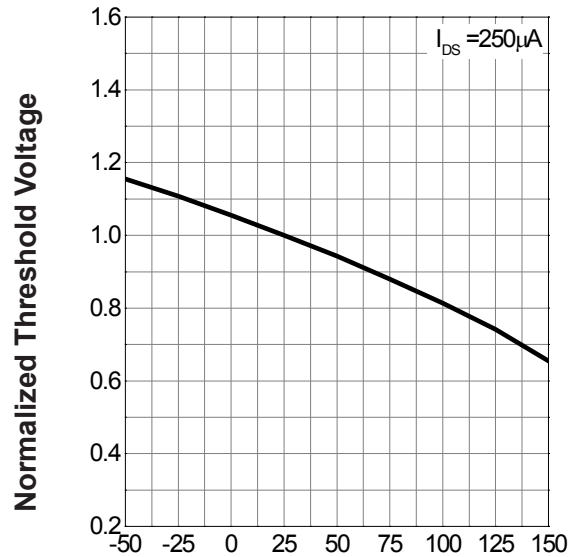
Typical Characteristics (Cont.)

Gate-Source On Resistance



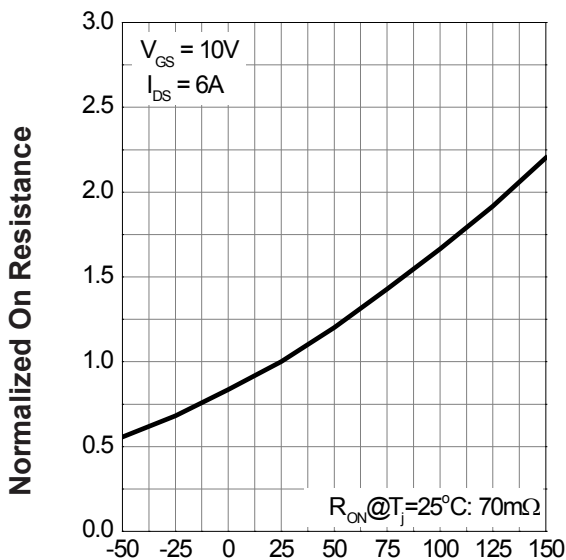
V<sub>GS</sub> - Gate - Source Voltage (V)

Gate Threshold Voltage



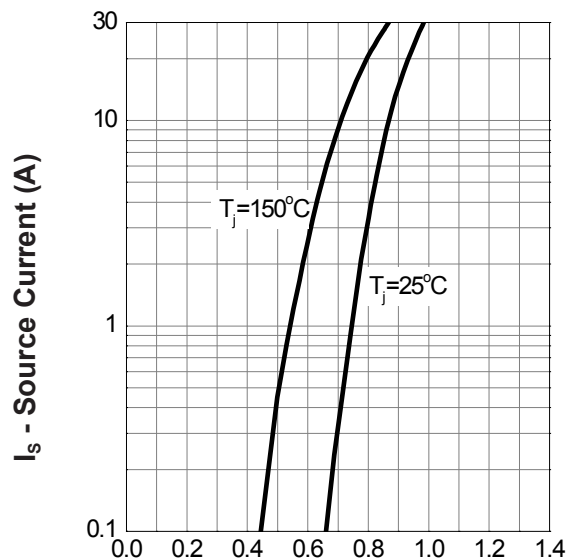
T<sub>J</sub> - Junction Temperature (°C)

Drain-Source On Resistance



T<sub>J</sub> - Junction Temperature (°C)

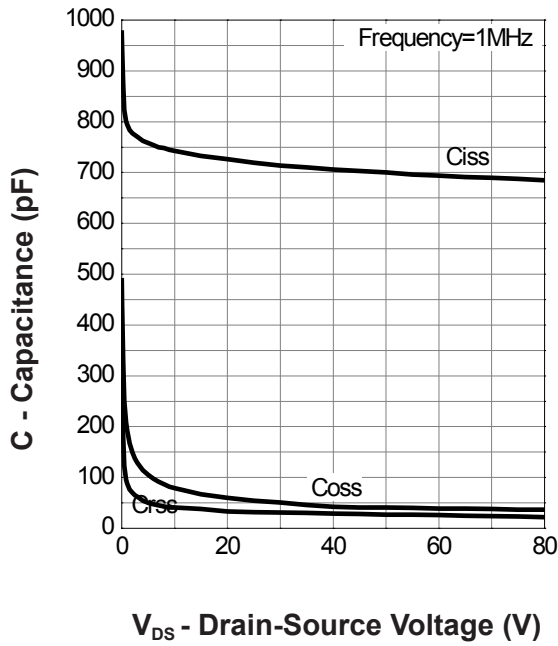
Source-Drain Diode Forward



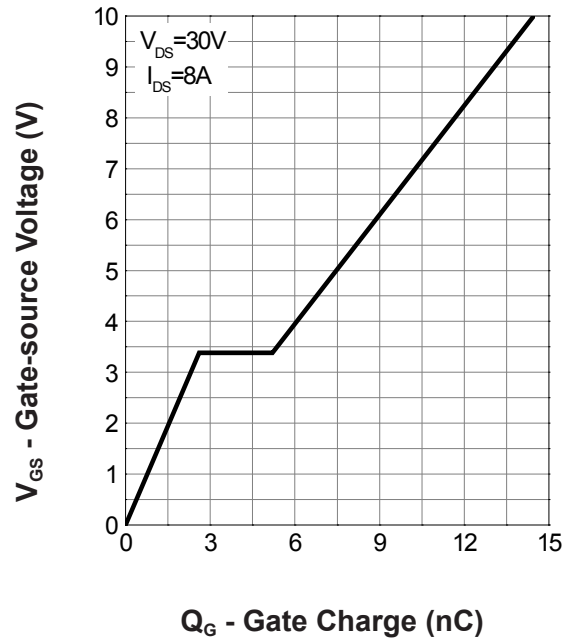
V<sub>SD</sub> - Source - Drain Voltage (V)

Typical Characteristics (Cont.)

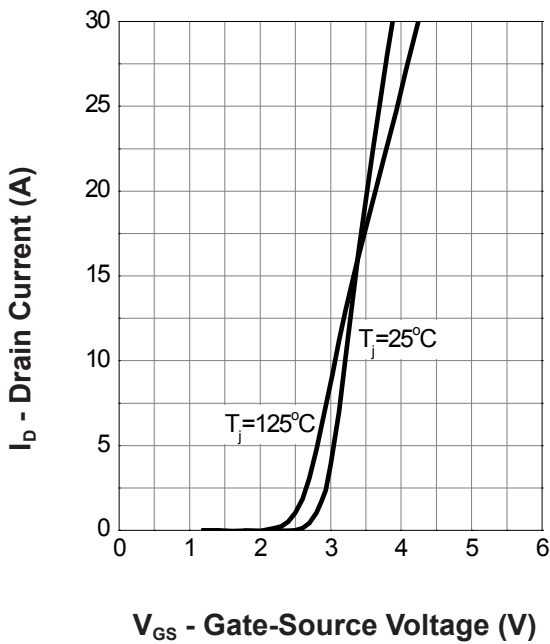
Capacitance



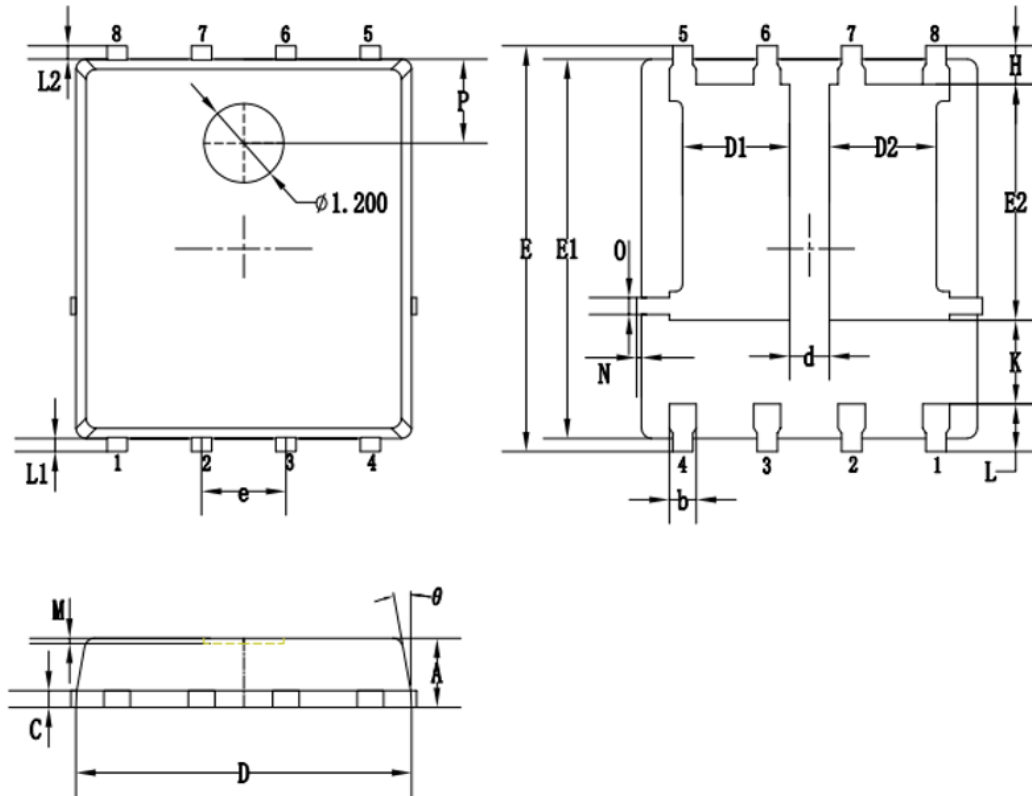
Gate Charge



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/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
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.		
$\theta$	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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