General Description

The series of devices use advanced trench gate super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

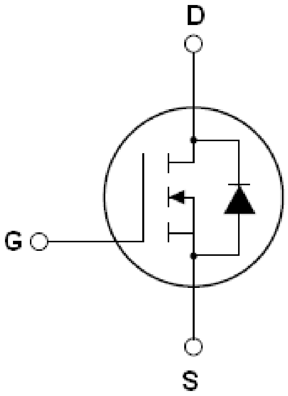
Features

- New technology for high voltage device
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested
- ROHS compliant

Application

- Power factor correction（PFC）
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply（UPS）

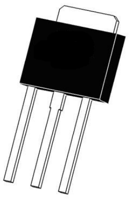
V_{DS}	650	V
$R_{DS(ON)TYP.}$	950	mΩ
I_D	4	A



Schematic diagram

Package Marking And Ordering Information

Device	Device Package	Marking
LM65T1K2I	TO-251	NCE65T1K2I



TO-251

Table 1. Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS}=0V）	V_{DS}	650	V
Gate-Source Voltage (V_{DS}=0V) ,AC (f>1 Hz)	V_{GS}	±30	V
Continuous Drain Current at Tc=25°C	$I_{D\ (DC)}$	4	A
Continuous Drain Current at Tc=100°C	$I_{D\ (DC)}$	2.5	A
Pulsed drain current **(Note 1)**	$I_{DM\ (pluse)}$	16	A
Maximum Power Dissipation(Tc=25℃)	P_D	41	W
Derate above 25°C		0.328	W/°C
Single pulse avalanche energy **(Note2)**	E_{AS}	27	mJ
Avalanche current **(Note 1)**	I_{AR}	0.7	A
Repetitive Avalanche energy , t_{AR} limited by T_{jmax} **(Note 1)**	E_{AR}	0.1	mJ

Parameter	Symbol	Value	Unit
Drain Source voltage slope, V_{DS} ≤480 V,	dv/dt	50	V/ns
Reverse diode dv/dt，V_{DS} ≤480 V,I_{SD}<I_D	dv/dt	15	V/ns
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55...+150	°C

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance，Junction-to-Case（Maximum）	R_{thJC}	3.0	°C /W
Thermal Resistance，Junction-to-Ambient （Maximum）	R_{thJA}	62	°C /W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	650			V
Zero Gate Voltage Drain Current(Tc=25℃)	I_{DSS}	V_{DS}=650V,V_{GS}=0V			1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I_{DSS}	V_{DS}=650V,V_{GS}=0V			50	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	3		4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A		950	1100	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz		304		pF
Output Capacitance	C_{oss}			18		pF
Reverse Transfer Capacitance	C_{rss}			0.6		pF
Total Gate Charge	Q_g	V_{DS}=480V,I_D=4A, V_{GS}=10V		8.8	12	nC
Gate-Source Charge	Q_{gs}			2.3		nC
Gate-Drain Charge	Q_{gd}			4		nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=380V,I_D=2.5A, R_G=5Ω,V_{GS}=10V		8		nS
Turn-on Rise Time	t_r			4		nS
Turn-Off Delay Time	$t_{d(off)}$			52	70	nS
Turn-Off Fall Time	t_f			9	18	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}	T_C=25°C			4	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				16	A
Forward On Voltage	V_{SD}	Tj=25°C,I_{SD}=4A,V_{GS}=0V		0.9	1.2	V
Reverse Recovery Time	t_{rr}	Tj=25°C,I_F=2A,di/dt=100A/μs		200		nS
Reverse Recovery Charge	Q_{rr}			0.6		uC
Peak reverse recovery current	I_{rrm}			6		A

Notes: 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. Tj=25℃,VDD=50V,VG=10V, R_G=25Ω

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

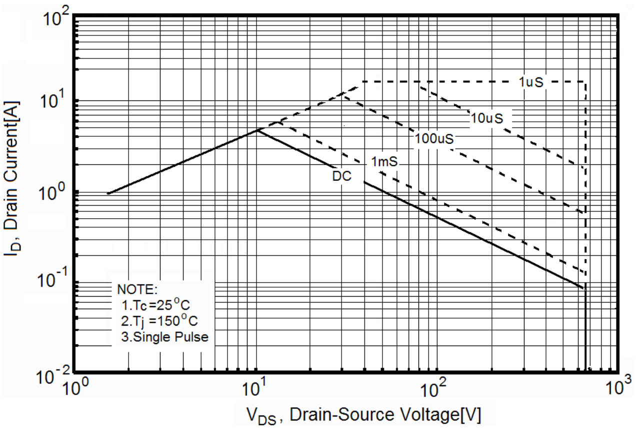


Figure2. Source-Drain Diode Forward Voltage

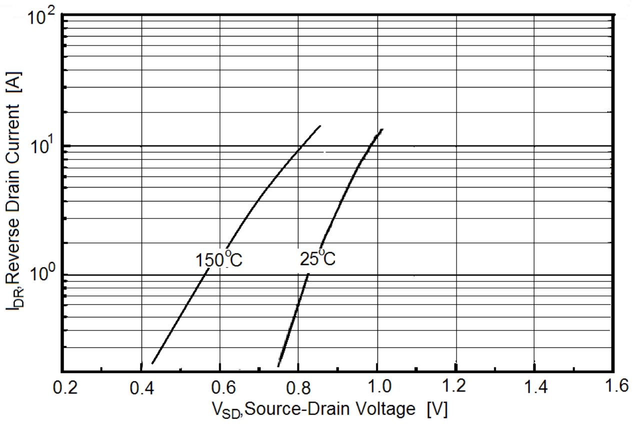


Figure3. Output characteristics

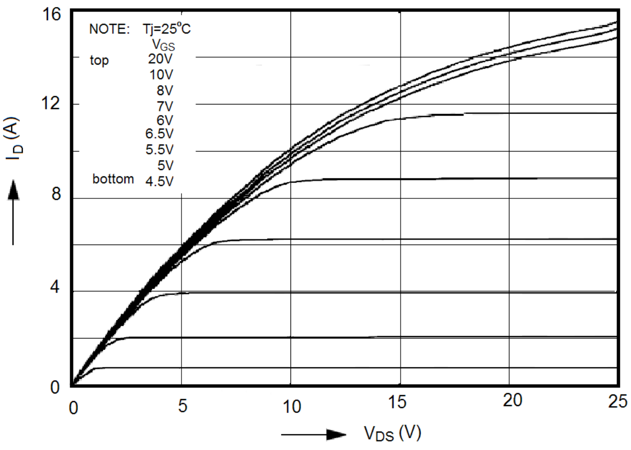


Figure4. Transfer characteristics

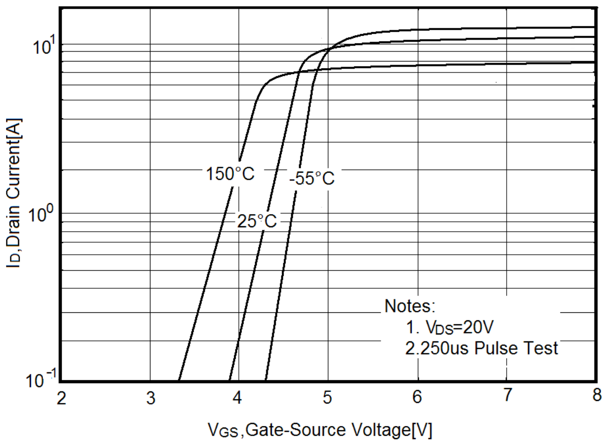


Figure5. Static drain-source on resistance

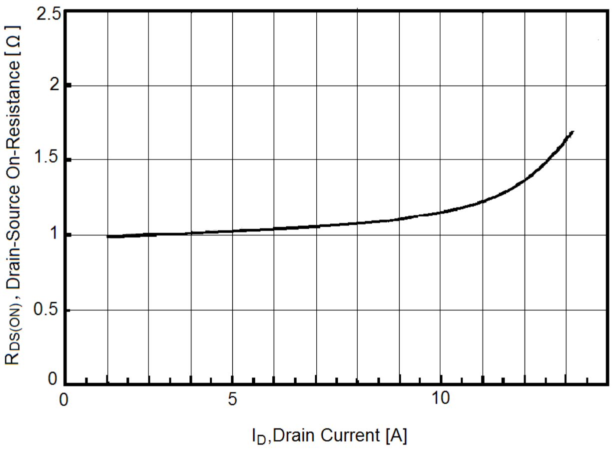


Figure6. $R_{DS(ON)}$ vs Junction Temperature

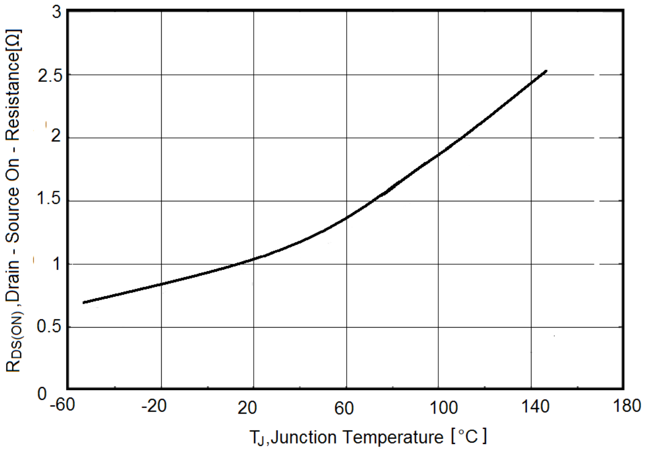


Figure7. BV_{DSS} vs Junction Temperature

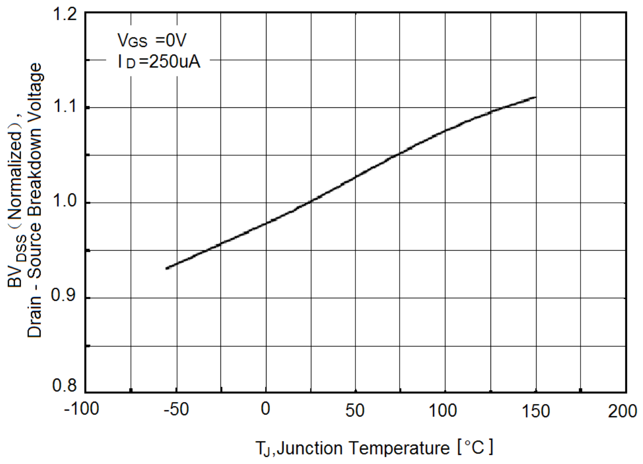


Figure8. Maximum I_D vs Junction Temperature

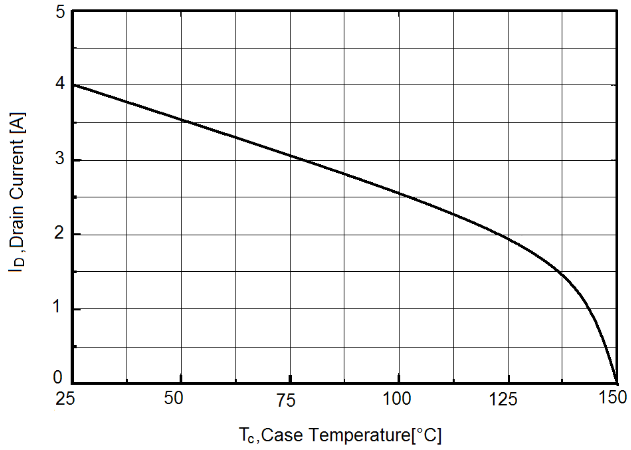


Figure9. Gate charge waveforms

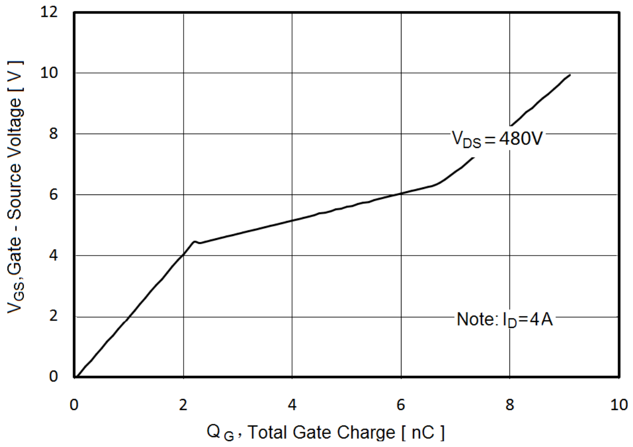


Figure10. Capacitance

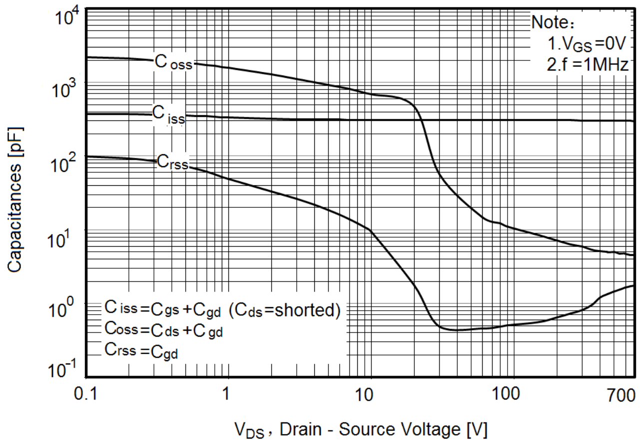
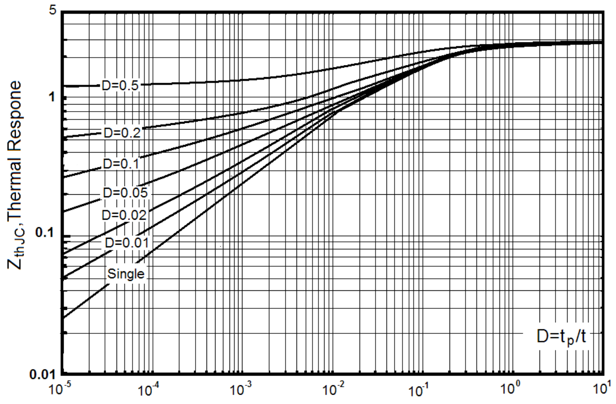
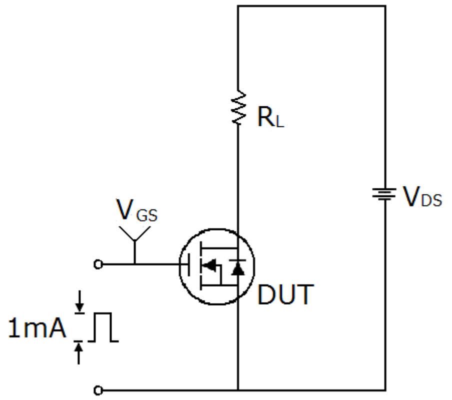


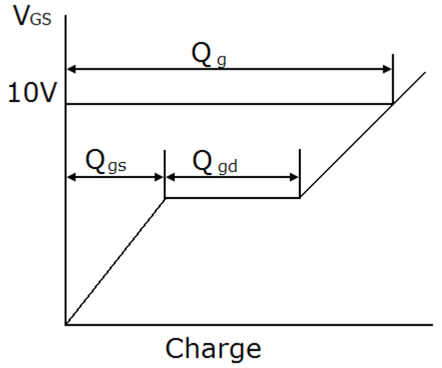
Figure11. Transient Thermal Impedance



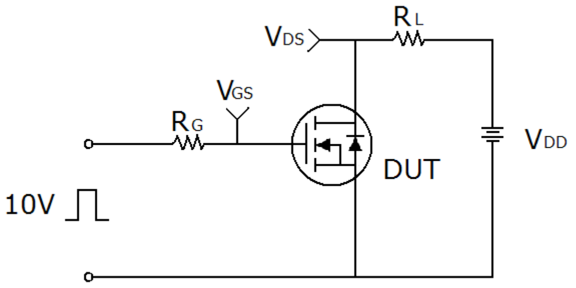
Test circuit

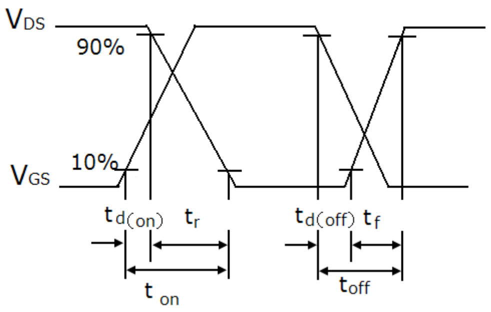
1）Gate charge test circuit & Waveform



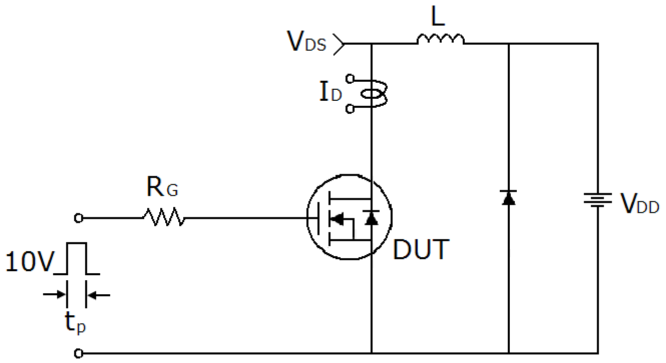


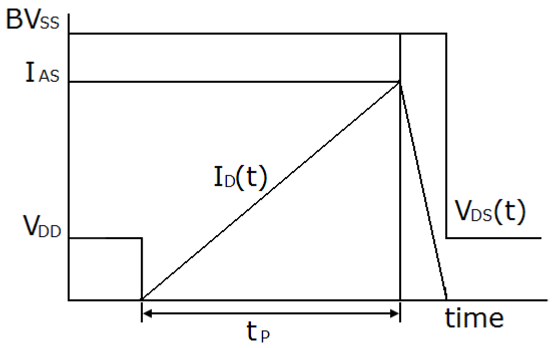
2）Switch Time Test Circuit:



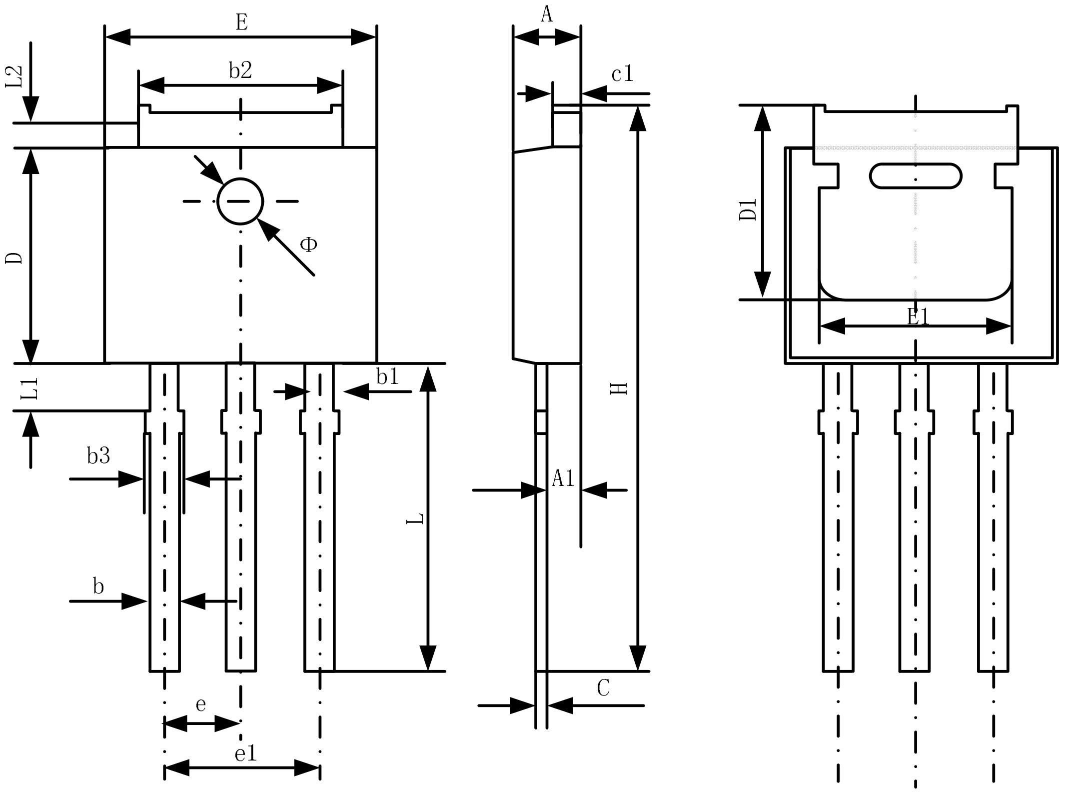


3）Unclamped Inductive Switching Test Circuit & Waveforms





TO-251 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.35	0.087	0.093
A1	0.90	1.10	0.035	0.043
b	0.56	0.69	0.022	0.027
b1	0.77	0.90	0.030	0.035
b2	5.23	5.43	0.206	0.214
b3		1.05	0.000	0.041
C	0.46	0.59	0.018	0.023
c1	0.46	0.59	0.018	0.023
D	6.00	6.20	0.236	0.244
D1	5.20		0.205	
E	6.50	6.70	0.256	0.264
E1	4.60	5.00	0.181	
e	2.24	2.34	0.088	0.092
e1	4.47	4.67	0.176	0.184
H	16.18	16.78	0.637	0.661
L	9.00	9.60	0.354	0.378
L1	0.95	1.35	0.037	0.053
L2	0.90	1.25	0.035	0.049

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