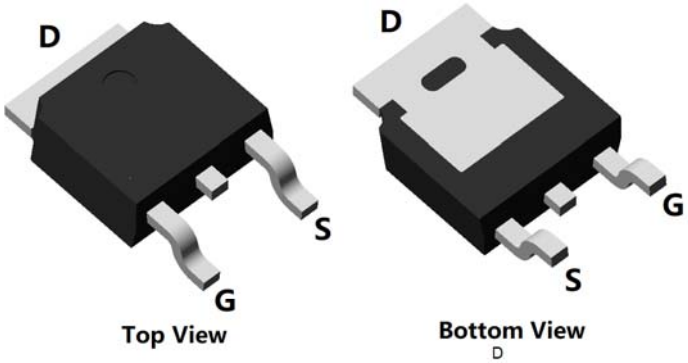
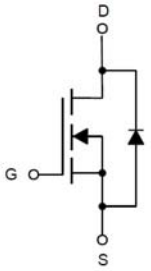
N-Channel Enhancement Mode Field Effect Transistor



TO-252



Product Summary

- V_{DS} 40 V
- I_D 60 A
- $R_{DS(ON)}$(at V_{GS}= 10V) ＜7.0 mohm
- $R_{DS(ON)}$(at V_{GS}= 4.5V) ＜9.5 mohm
- 100% EAS Tested
- 100% ▽V_{DS} Tested
- ESD Level(HBM) Class 1C

General Description

- Trench Power LV MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- High current load applications
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

■ Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	±20	V
Drain Current	T_C=25℃	I_D	60	A
	T_C=100℃		38	
Pulsed Drain Current [A]		I_{DM}	200	A
Total Power Dissipation	T_C=25℃	P_D	44	W
	T_C=100℃		17	W
Single Pulse Avalanche Energy [B]		E_{AS}	110	mJ
Thermal Resistance Junction-to-Case [C]		$R_{\theta JC}$	2.8	℃/ W
Junction and Storage Temperature Range		T_J ,T_{STG}	-55～+150	℃

■ Ordering Information (Example)

PREFERED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
D60N04A	F1/F2	D60N04A	2500	/	25000	13“ reel

■ Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Static Parameter							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V, I_D=250μA		40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V	T_J=25℃			1	μA
			T_J=150℃			100	
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		1.0	1.5	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}= 10V, I_D=20A			5.4	7	mΩ
		V_{GS}= 4.5V, I_D=10A			6.8	9.5	
Diode Forward Voltage	V_{SD}	I_S=20A,V_{GS}=0V			0.8	1.2	V
Maximum Body-Diode Continuous Current	I_S					60	A
Dynamic Parameters							
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V,f=1MHZ			1860		pF
Output Capacitance	C_{oss}				256		
Reverse Transfer Capacitance	C_{rss}				205		
Switching Parameters							
Total Gate Charge	Q_g	V_{GS}=10V,V_{DS}=20V,I_D=20A			46.7		nC
Gate-Source Charge	Q_{gs}				8		
Gate-Drain Charge	Q_{gd}				11.6		
Reverse Recovery Charge	Q_{rr}	I_F=20A, di/dt=100A/us			2.3		
Reverse Recovery Time	t_{rr}				15		ns
Turn-on Delay Time	$t_{D(on)}$	V_{GS}=10V,V_{DD}=20V, I_D=2A,R_L=1Ω R_{GEN}=3Ω			10		
Turn-on Rise Time	t_r				21		
Turn-off Delay Time	$t_{D(off)}$				36		
Turn-off fall Time	t_f				25		

A. Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.

B. T_j=25℃, V_{DD}=38V, V_G=10V, L=0.5mH, IAS=21A

C. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented

■ Typical Performance Characteristics

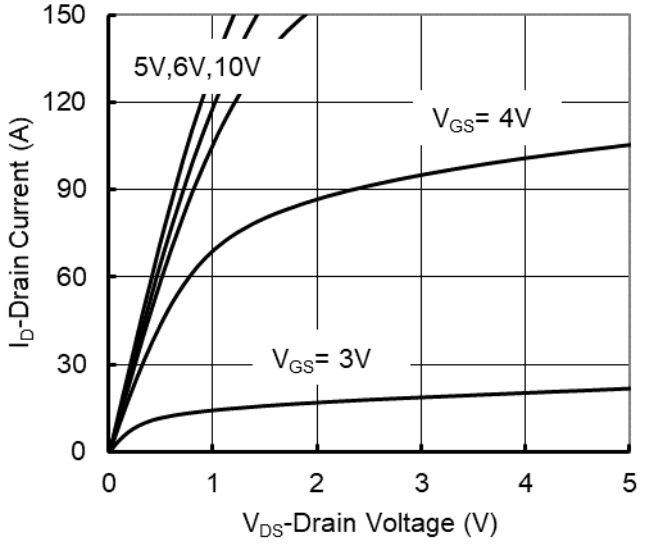


Figure 1. Output Characteristics

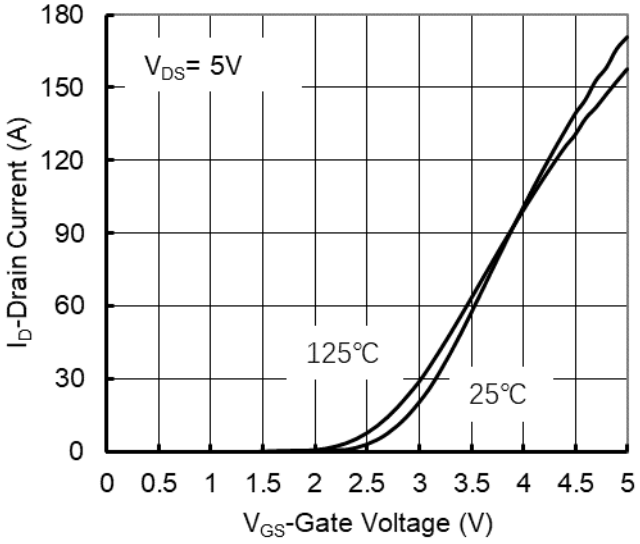


Figure 2. Transfer Characteristics

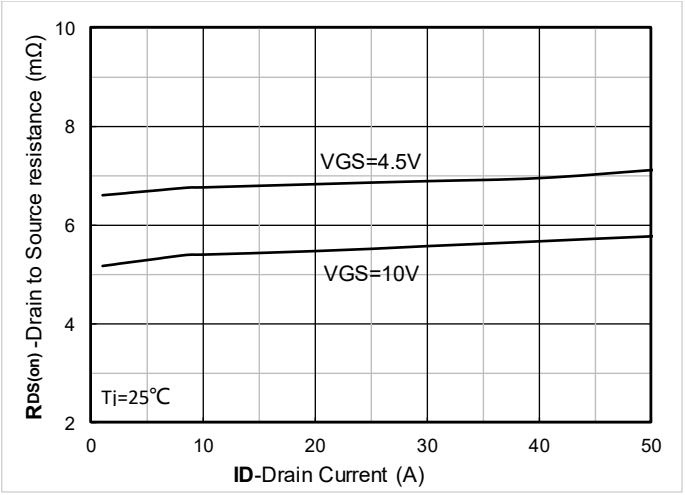


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

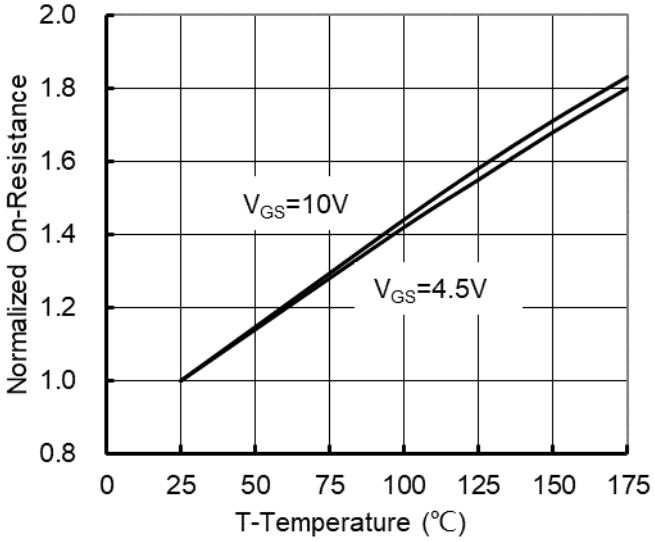


Figure 4. On-Resistance vs. Junction Temperature

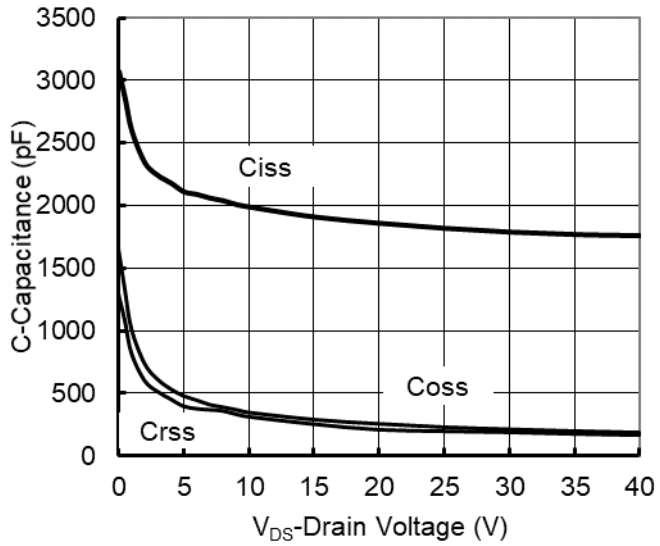


Figure 5. Capacitance Characteristics

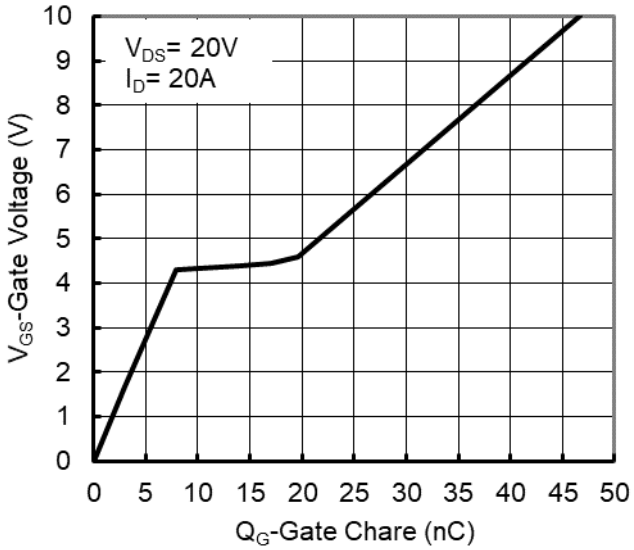


Figure 6. Gate Charge

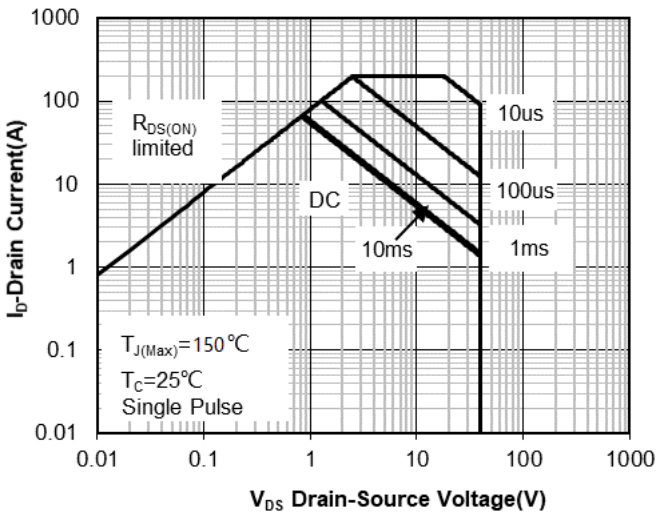


Figure 7. Safe Operation Area

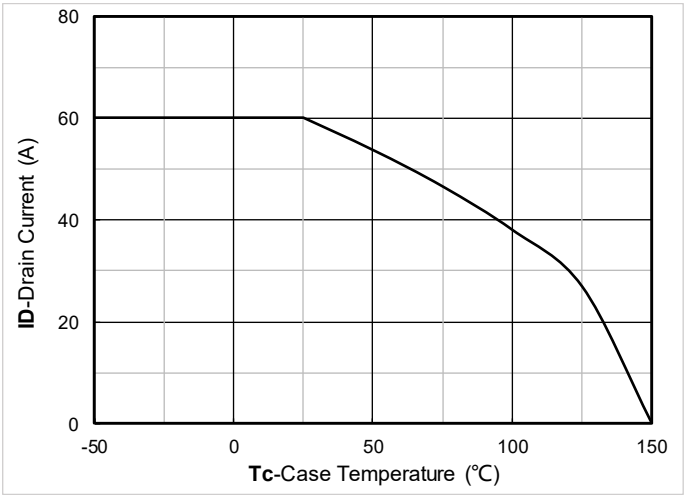


Figure 8. Maximum Continuous Drain Current vs Case Temperature

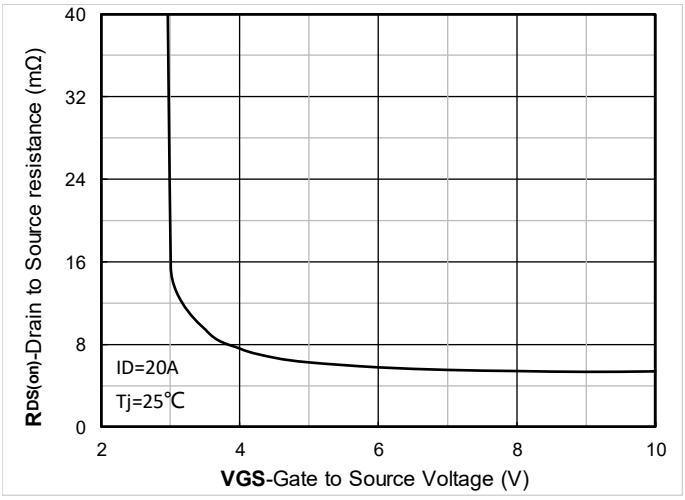


Figure 9. On-Resistance vs Gate to Source Voltage

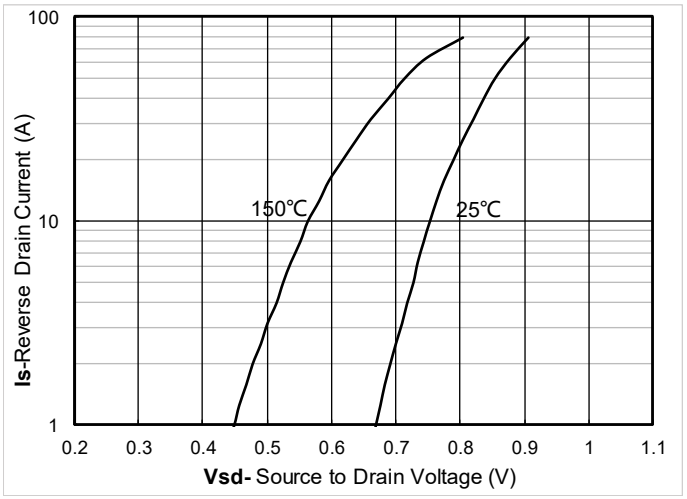


Figure 10. Forward characteristics of reverse diode

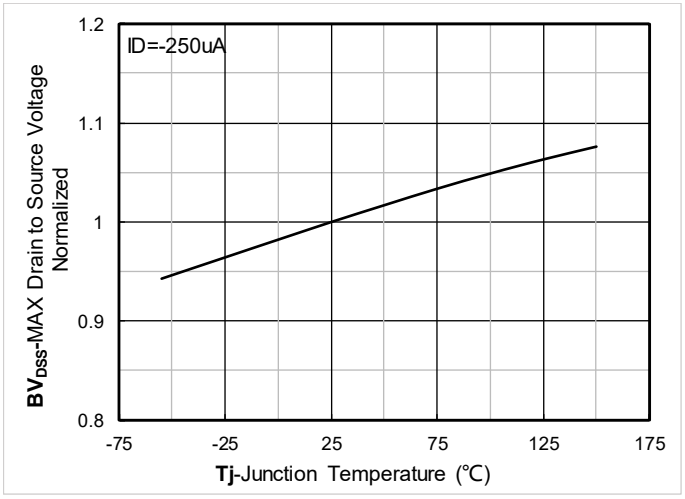


Figure 11. Normalized breakdown voltage

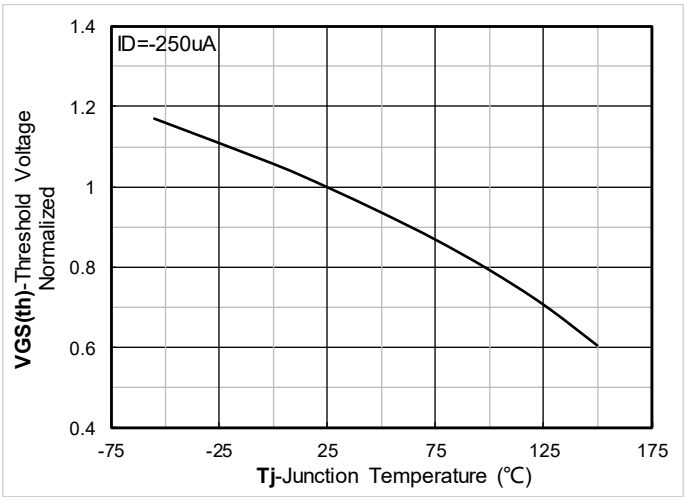


Figure 12. Normalized Threshold voltage

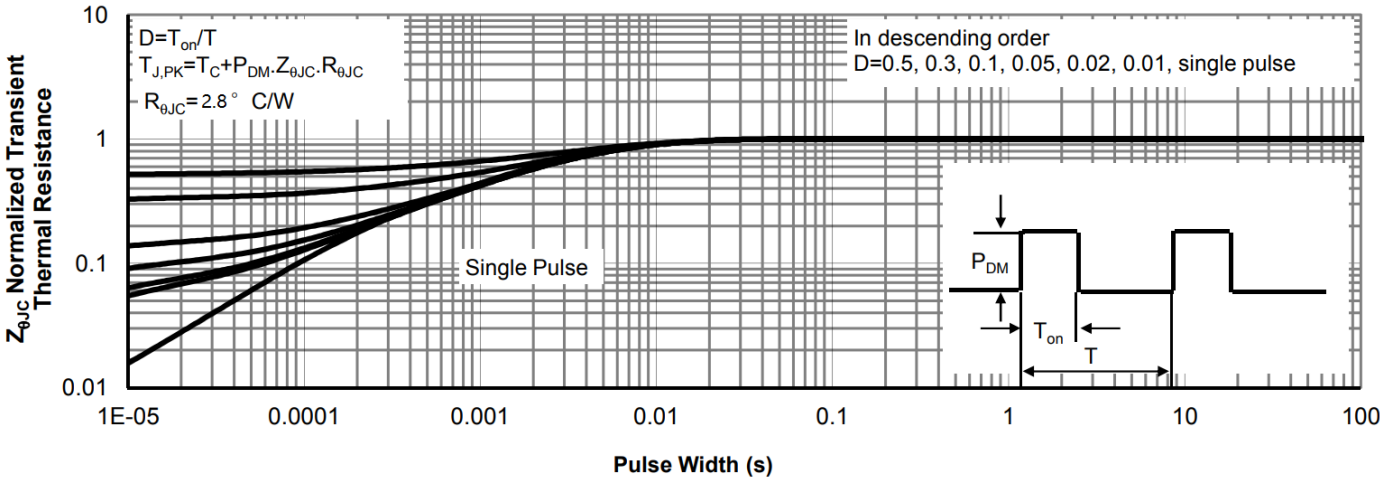
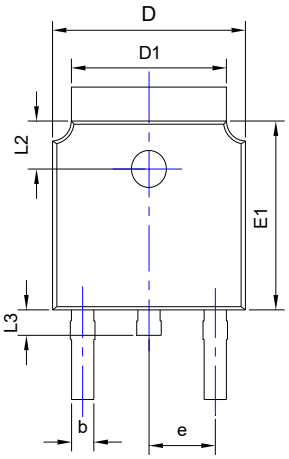
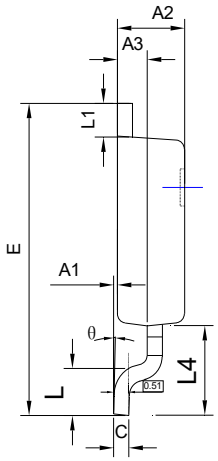


Figure 13. Normalized Maximum Transient Thermal Impedance

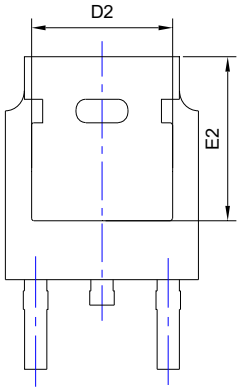
■ TO-252-B Package information



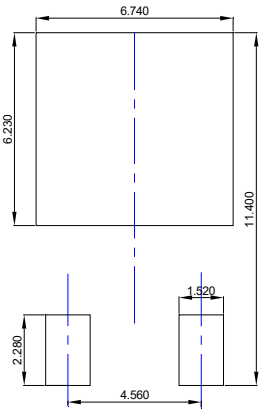
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SUGGESTED SOLDER PAD LAYOUT

UNIT：mm

DIMENSIONS						
SYMBOL	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.008	0.000	---	0.200
A2	0.087	0.091	0.094	2.200	2.300	2.400
A3	0.035	0.039	0.043	0.900	1.000	1.100
b	0.026	0.030	0.034	0.660	0.760	0.860
c	0.018	0.020	0.023	0.460	0.520	0.580
D	0.256	0.260	0.264	6.500	6.600	6.700
D1	0.203	0.209	0.215	5.150	5.300	5.450
D2	0.181	0.189	0.195	4.600	4.800	4.950
E	0.390	0.398	0.406	9.900	10.100	10.300
E1	0.236	0.240	0.244	6.000	6.100	6.200
E2	0.203	0.209	0.215	5.150	5.300	5.450
e	0.090BSC			2.286BSC		
L	0.049	0.059	0.069	1.250	1.500	1.750
L1	0.035	---	0.050	0.900	---	1.270
L2	0.055	---	0.075	1.400	---	1.900
L3	0.024	0.031	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
θ	0°	---	10°	0°	---	10°

NOTE:
1.PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2.TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
3.THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.

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