

## MOSFET Silicon N-Channel MOS



### 1. Applications

Synchronous rectification in SMPS,  
Hard switching and High speed circuit  
DC/DC in telecoms and industrial

### 2. Features

Low drain-source on-resistance:  
TO220&TO263  $R_{DS(on)} = 2.1\text{m}\Omega$  (typ.)  
TOLL-8L  $R_{DS(on)} = 1.8\text{m}\Omega$  (typ.)  
High speed power switching  
Enhanced body diode dv/dt capability  
Enhanced avalanche ruggedness

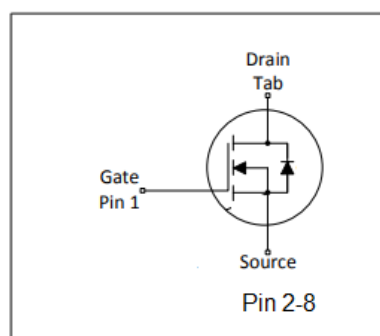
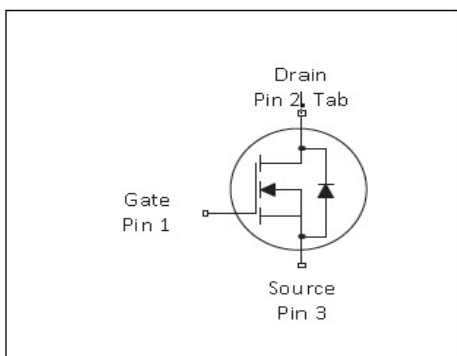
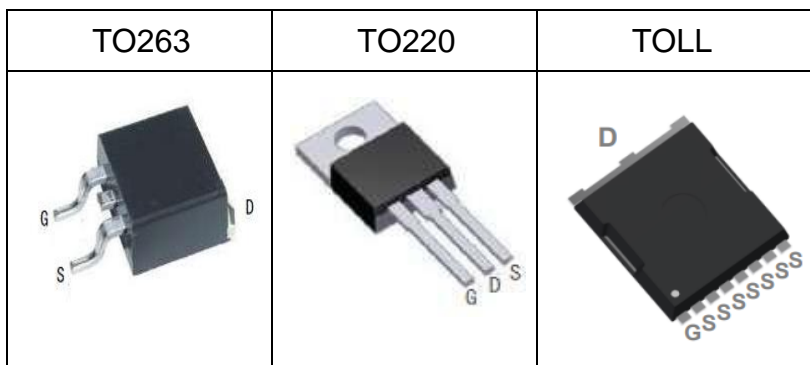


**Table 1 Key Performance Parameters**

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	85	V
TO220&263 $R_{DS(on),max}$	2.6	m $\Omega$
TOLL 8L $R_{DS(on),max}$	2.0	m $\Omega$
$Q_{g,typ}$	152	nC
$I_{D,pulse}$	998	A

### 3. Packaging and Internal Circuit

Part Name	Package	Marking
AUP026N085	TO220	AUP026N085
AUB026N085	TO263	AUB026N085
AUR020N085	TOLL	AUR020N085



## 1 Maximum ratings

At  $T_j = 25^\circ\text{C}$ , unless otherwise specified

**Table 2 Maximum ratings**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current at silicon <sup>1)</sup>	$I_D$		-	247	A	$T_C = 25^\circ\text{C}$
Continuous drain current at package <sup>1)</sup>	$I_D$		-	195	A	$T_C = 25^\circ\text{C}$
Continuous drain current at silicon <sup>1)</sup>	$I_D$			156	A	$T_C = 100^\circ\text{C}$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-		998	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	$E_{AS}$	-	-	970	mJ	$T_C = 25^\circ\text{C}$ , $V_{DD} = 50\text{V}$ , $V_{gs} = 10\text{V}$ , $L = 0.5\text{mH}$ , $R_G = 25\Omega$
Avalanche current, single pulse	$I_{AR}$	-	-	62	A	$T_C = 25^\circ\text{C}$ , $V_{DD} = 50\text{V}$ , $L = 0.5\text{mH}$ , $R_G = 25\Omega$
Gate source voltage (static)	$V_{GS}$	-20	-	20	V	static;
Power dissipation	$P_{tot}$	-	-	275	W	$T_C = 25^\circ\text{C}$
Storage temperature	$T_{stg}$	-55	-	150	$^\circ\text{C}$	
Operating junction temperature	$T_j$	-55	-	150	$^\circ\text{C}$	
Soldering Temperature Distance of 1.6mm from case for 10s	$T_L$			300	$^\circ\text{C}$	

<sup>1)</sup>Limited by  $T_{j,max}$ . Maximum Duty Cycle  $D = 0.50$

<sup>2)</sup>Pulse width  $t_p$  limited by  $T_{j,max}$

<sup>3)</sup>Identical low side and high side switch with identical  $R_G$

## 2 Thermal characteristics

**Table Thermal characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{thJC}$	-	-	0.46	°C/W	-
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	63	°C/W	device on PCB, minimal footprint

**Table Thermal characteristics(TOLL)**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{thJC}$	-	-	0.28	°C/W	-
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	48	°C/W	device on PCB, minimal footprint

### 3 Electrical characteristics

at  $T_j=25^{\circ}\text{C}$ , unless otherwise specified

**Table 4 Static characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	85	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	2.5		4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=85V, V_{GS}=0V, T_j=25^{\circ}\text{C}$
Gate-source leakage current	$I_{GSS}$	-	-	+/-100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance (TO220&263)	$R_{DS(on)}$	-	2.1	2.6	m $\Omega$	$V_{GS}=10V, I_D=20A, T_j=25^{\circ}\text{C}$
Drain-source on-state resistance (TOLL)	$R_{DS(on)}$	-	1.8	2.0	m $\Omega$	$V_{GS}=10V, I_D=20A, T_j=25^{\circ}\text{C}$
Gate resistance (Intrinsic)	$R_G$	-	2.1	-	$\Omega$	$f=1\text{MHz}$ , open drain

**Table 5 Dynamic characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	11000	-	PF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$
Output capacitance	$C_{oss}$	-	3500	-	PF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$
Reverse transfer capacitance	$C_{riss}$	-	350	-	PF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	-	33	-	ns	$V_{DD}=42V, V_{GS}=10V, I_D=80A, R_G=2.5\Omega$
Rise time	$t_r$	-	47	-	ns	$V_{DD}=42V, V_{GS}=10V, I_D=80A, R_G=2.5\Omega$
Turn-off delay time	$t_{d(off)}$	-	89	-	ns	$V_{DD}=42V, V_{GS}=10V, I_D=80A, R_G=2.5\Omega$
Fall time	$t_f$	-	46	-	ns	$V_{DD}=42V, V_{GS}=10V, I_D=80A, R_G=2.5\Omega$

**Table 6 Gate charge characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	46	-	nC	$V_{DD}=42V, I_D=80A, V_{GS}=10V$
Gate to drain charge	$Q_{gd}$	-	46	-	nC	$V_{DD}=42V, I_D=80A, V_{GS}=10V$
Gate charge total	$Q_g$	-	152	-	nC	$V_{DD}=42V, I_D=80A, V_{GS}=10V$

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous Source Current at silicon	$I_{SD}$	-	-	229	A	Maximum Ratings
Diode forward voltage	$V_{SD}$	-	0.8	1.2	V	$V_{GS}=0V, I_s=1A, T_j=25^\circ C$
Reverse recovery time	$t_{rr}$	-	103	-	ns	$V_{GS}=0V, I_F=80A, di_F/dt=100A/\mu s$
Reverse recovery charge	$Q_{rr}$	-	118	-	nC	$V_{GS}=0V, I_F=80A, di_F/dt=100A/\mu s$

## 4 Electrical characteristics diagram

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

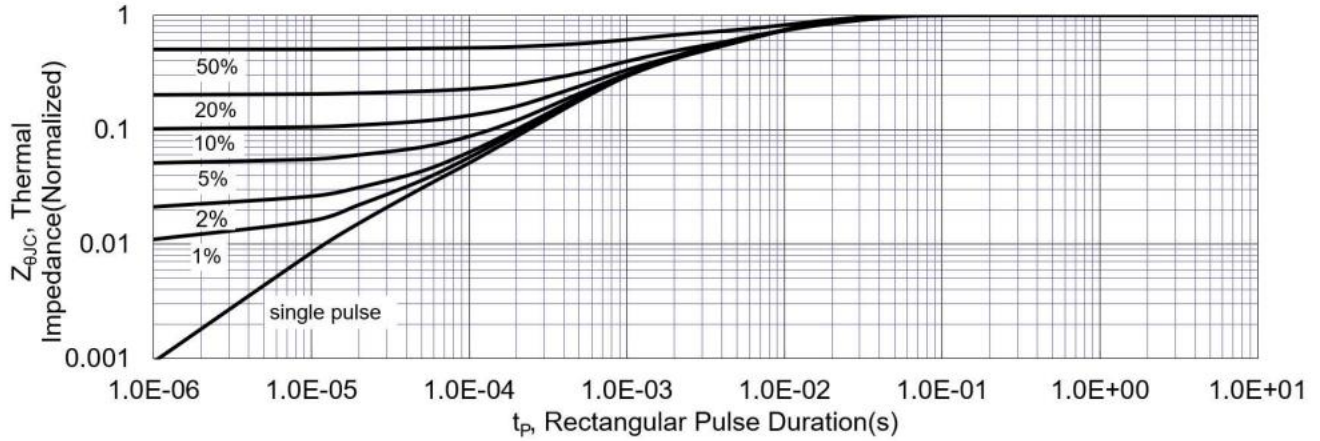


Figure 2. Maximum Power Dissipation vs. Case Temperature

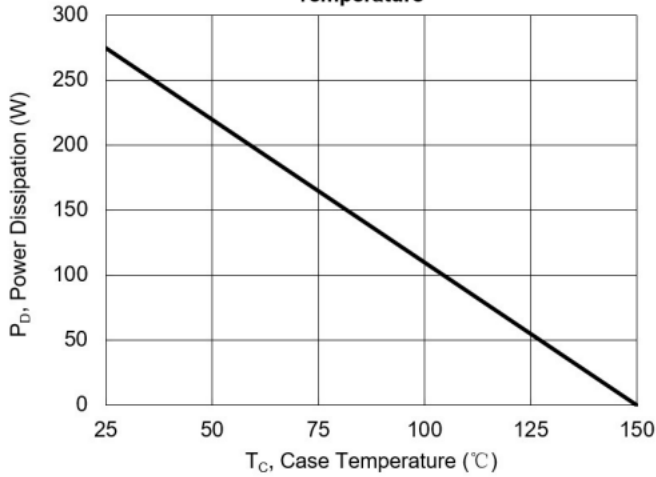


Figure 3. Maximum Continuous Drain Current vs Case Temperature

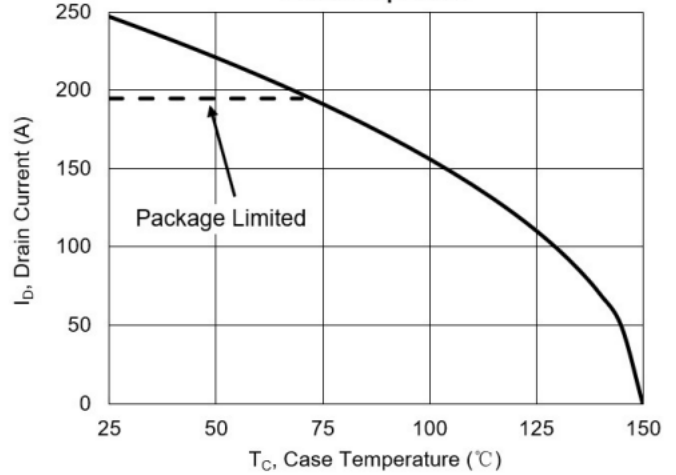


Figure 4. Typical Output Characteristics

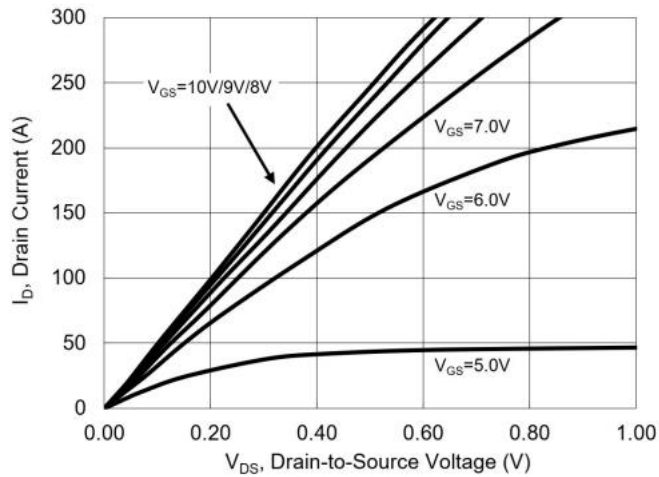


Figure 5. Unclamped Inductive Switching Capability

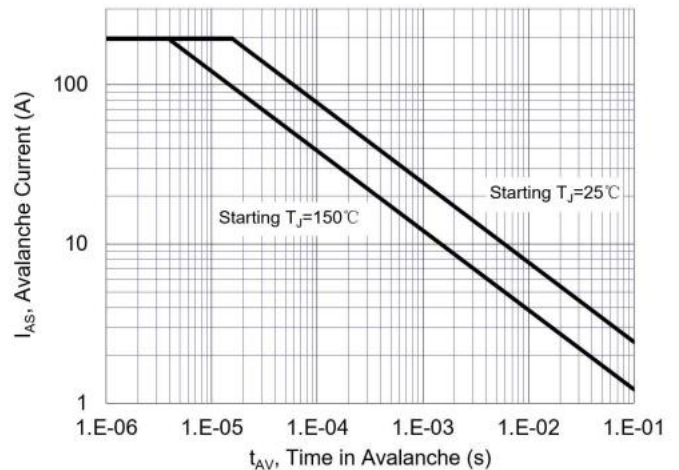


Figure 6. Maximum Peak Current Capability

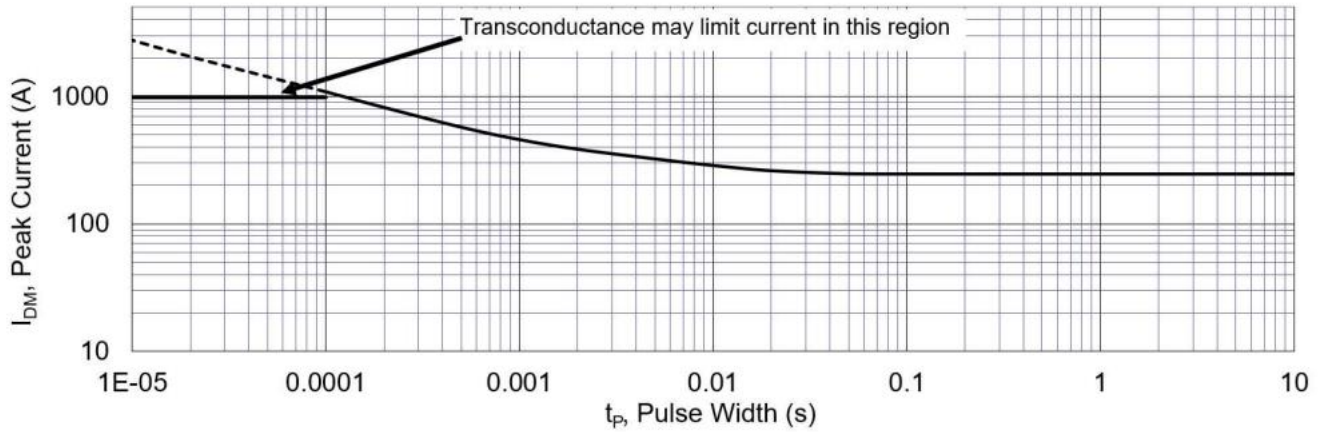


Figure 7. Maximum Forward Safe Operation Area

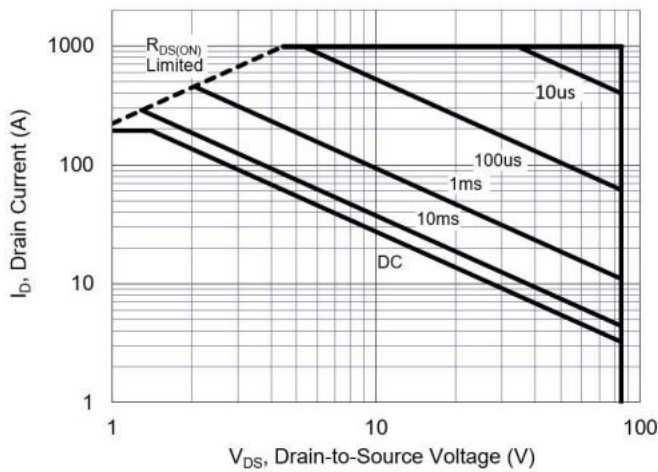


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

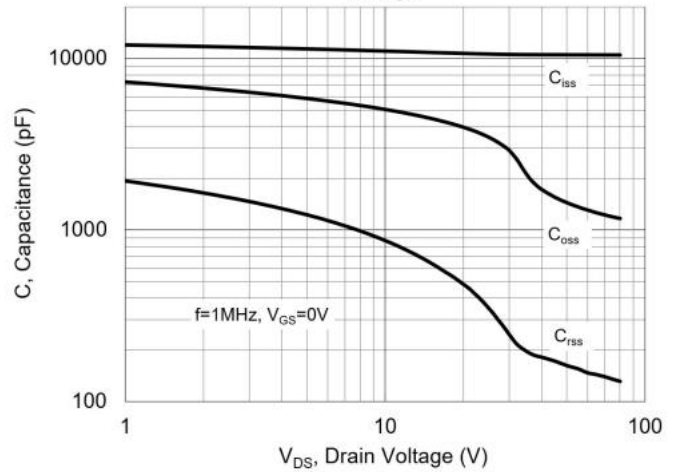
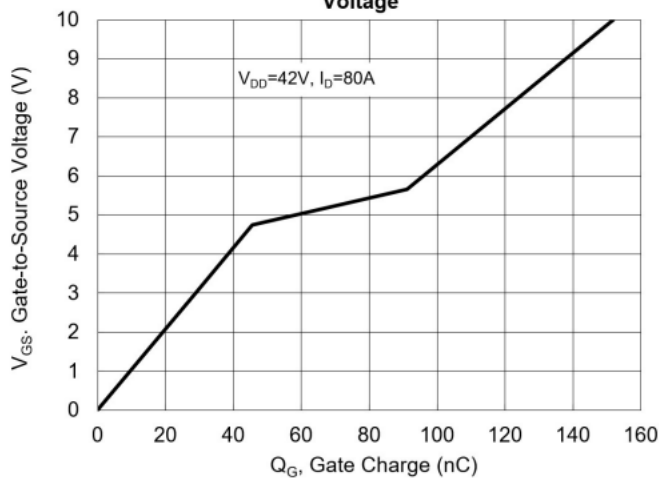


Figure 9. Typical Gate Charge vs. Gate-to-Source Voltage



### 5. Package Outlines

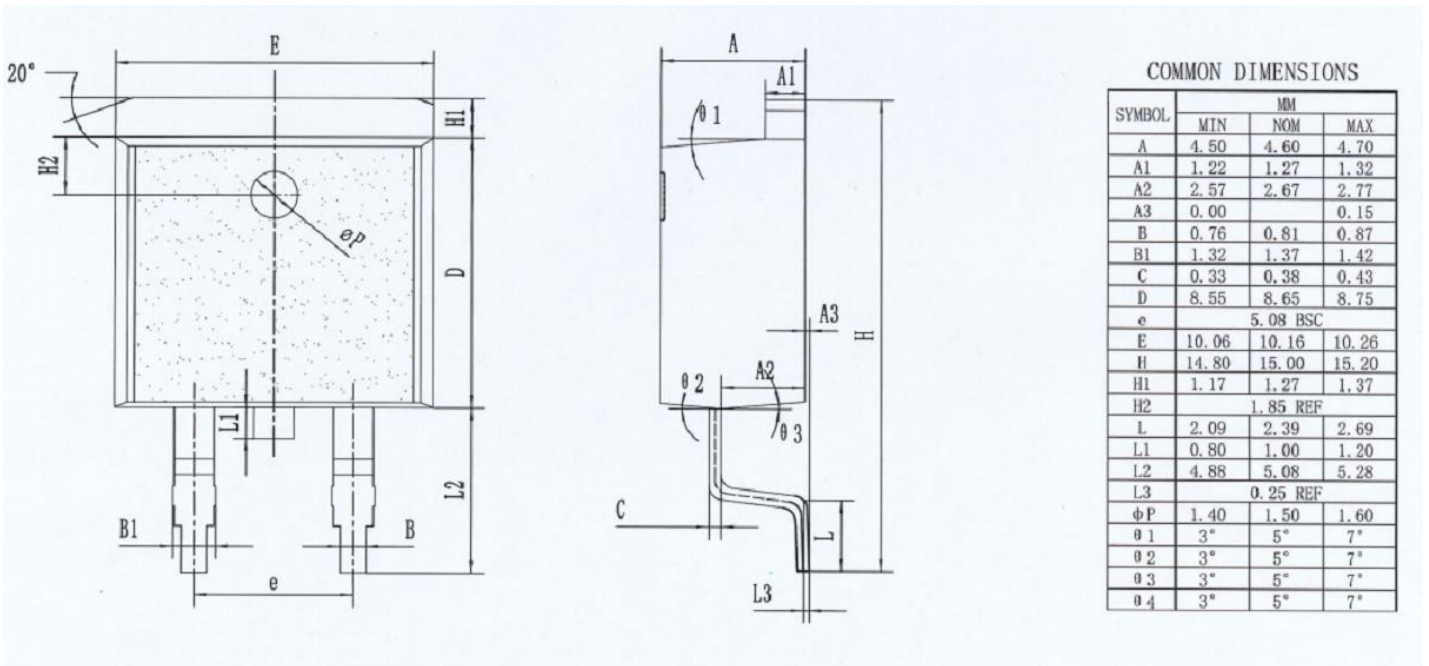
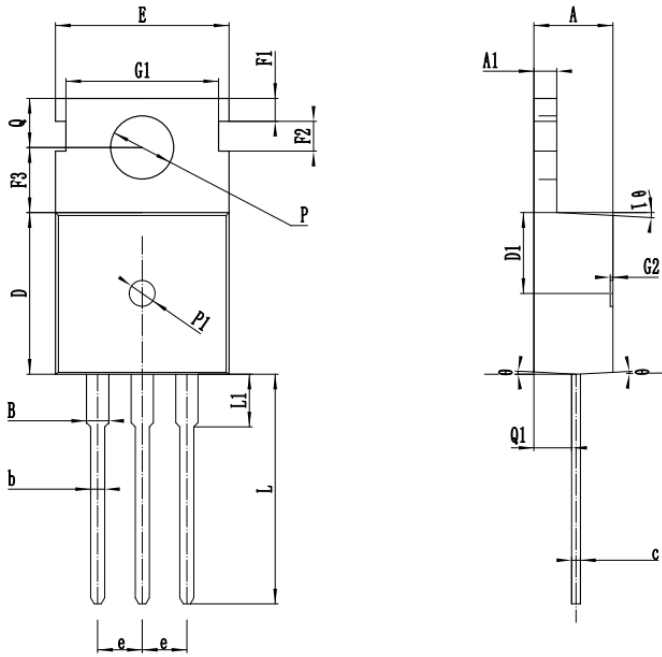


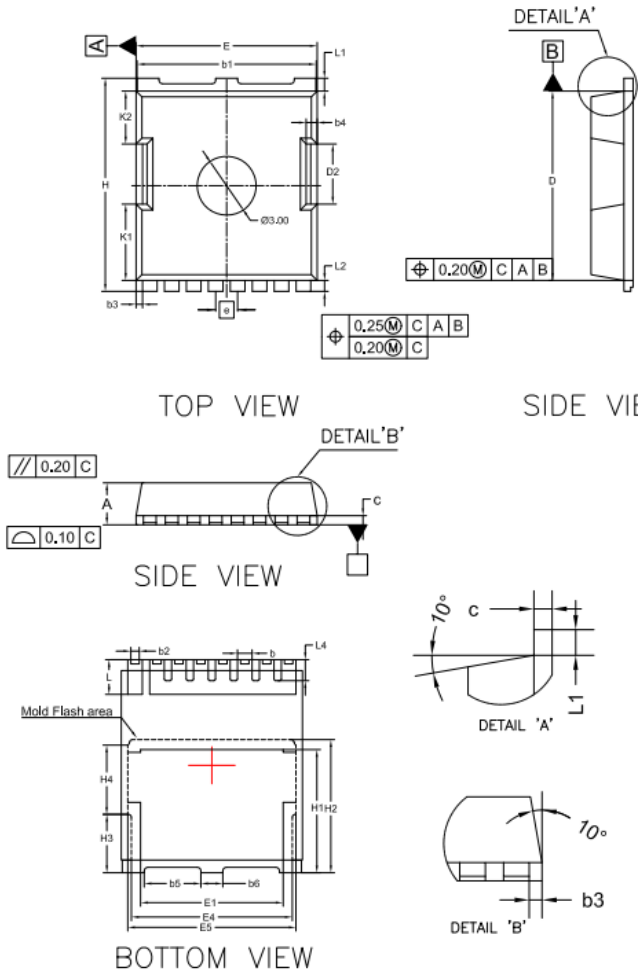
Figure1: Outline PG-T0263(LM)





符号 symbol	MIN	NOM	MAX
*A	4.400	4.500	4.600
*A1	1.290	1.300	1.380
*B	1.220	1.270	1.370
*b	0.760	0.800	0.900
*c	0.450	0.500	0.600
*D	9.100	9.200	9.300
*D1	4.500	4.600	4.700
*E	9.780	9.880	10.050
*E1	9.920	10.020	10.120
e	2.480	2.540	2.600
F1	1.220	1.300	1.380
F2	1.600	1.700	1.800
*F3	3.600	3.700	3.800
G1	8.600	8.700	8.800
G2	0.100	0.150	0.200
*L	12.980	13.080	13.230
L1	2.900	3.000	3.100
*ΦP	3.540	3.650	3.670
ΦP1	1.400	1.500	1.600
Q	2.700	2.800	2.900
*Q1	2.300	2.400	2.500
θ	1°	3°	5°
*θ1	1°	3°	5°

Figure2: Outline PG-TO220(LM)



SYMBOLS	DIMENSION IN MM		
	MIN	NOM	MAX
* A	2.200	2.300	2.400
c	0.492	0.500	0.508
* D	10.280	10.380	10.480
* E	9.800	9.900	10.000
e	1.20 BSC		
* H	11.580	11.680	11.780
H1	6.650	6.750	6.850
H2	7.300		
H3	3.200		
H4	3.800		
K1	4.180		
K2	2.900		
* D2	3.300		
b	0.700	0.800	0.900
b1	9.700	9.800	9.900
b2	0.420	0.460	0.500
b3	0.350		
b4	0.600		
b5	3.100		
b6	1.200		
L	1.700	1.900	2.100
L1	0.700		
L2	0.600		
L4	1.050	1.150	1.250
L5	0.500	0.600	0.700
E1	7.800		
E4	8.800		
E5	9.200		

Figure3: Outline PG-TOLL(JJW)

**Revision History**

Revision	Date	Subjects (major changes since last revision)
1.0	2022-08-02	Preliminary version
1.1	2022-09-13	Updated Vth limit
1.2	2023-04-12	Updated TO220&263 POD to LM and added TOLL package
1.3	2023-05-05	Updated TO220 POD to LM liangmian