


**TM60H03NF**

**N+N-Channel Enhancement Mode Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = 30V</math> <math>I_D = 60A</math>  <math>R_{DS(ON)} = 4.2m\Omega @ V_{GS}=10V</math></p> <p>100% UIS Tested          100% <math>R_g</math> Tested</p> 
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NF:DFN5x6-8L



Marking: 60H03

**Absolute Maximum Ratings** ( $T_C=25^\circ C$  unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	60	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	40	A
$I_{DM}$	Pulsed Drain Current	222	A
EAS	Single Pulse Avalanche Energy	45	mJ
$P_D @ T_C=25^\circ C$	Total Power Dissipation	36	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	3.6	$^\circ C/W$

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Electrical Characteristics: ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu A$	30	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=30V$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu A$	0.9	1.2	1.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>3</sup>	$V_{GS}=10V, I_D=30A$	---	4.2	5.5	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	---	7.5	12	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	1614	---	pF
$C_{oss}$	Output Capacitance		---	245	---	
$C_{rss}$	Reverse Transfer Capacitance		---	215	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, I_D=30A,$ $V_{GS}=10V, R_{GEN}=3\Omega$	---	7.5	---	ns
$t_r$	Rise Time		---	14.5	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	35.2	---	ns
$t_f$	Fall Time		---	9.6	---	ns
$Q_g$	Total Gate Charge		---	33.7	---	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS}=10V, V_{DS}=15V,$ $I_D=30A$	---	8.5	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		---	7.5	---	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	---	---	1.2	V
$I_S$	Continuous Source Current	$V_D=V_G=0V$	---	---	60	A
$I_{sm}$	Pulsed Source Current		---	--	222	A



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Typical Characteristics

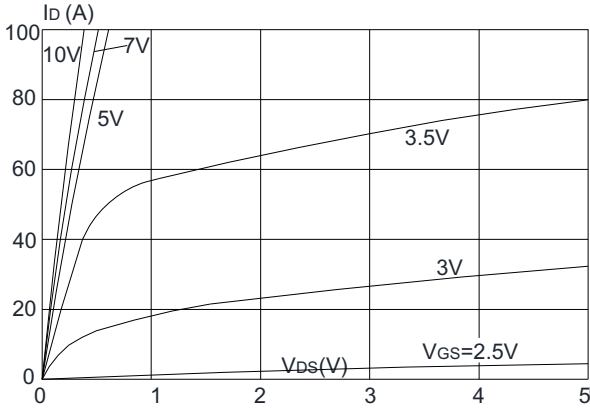


Figure 1: Output Characteristics

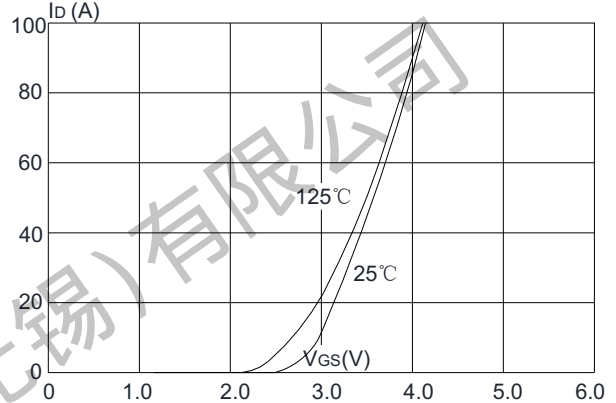


Figure 2: Typical Transfer Characteristics

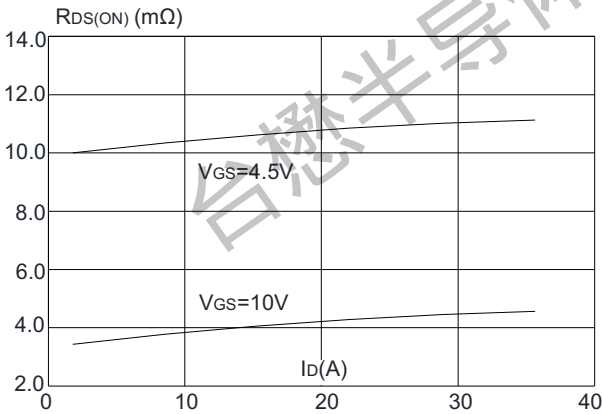


Figure 3: On-resistance vs. Drain Current

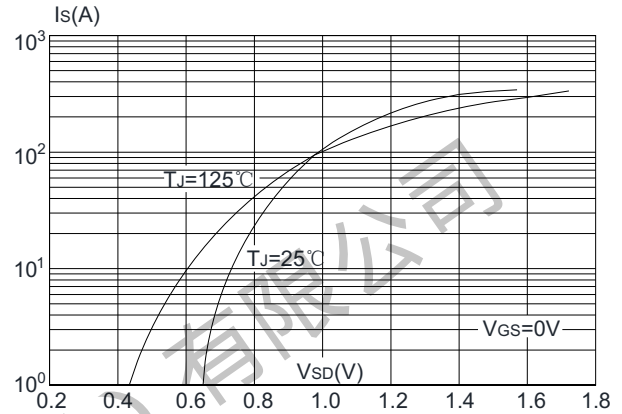


Figure 4: Body Diode Characteristics

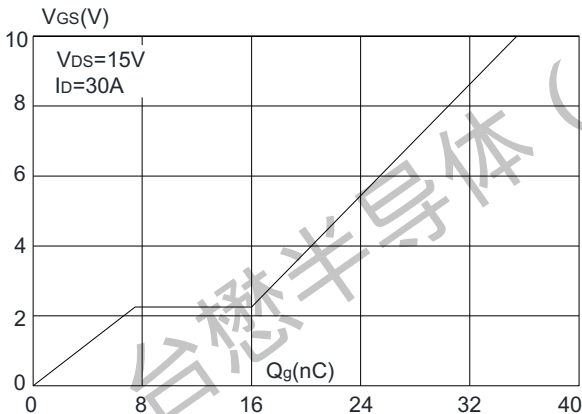


Figure 5: Gate Charge Characteristics

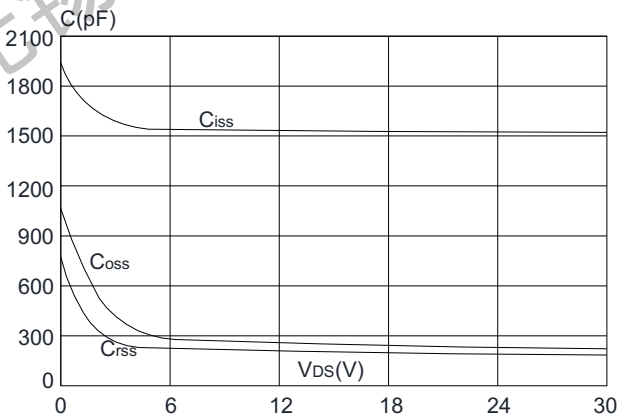
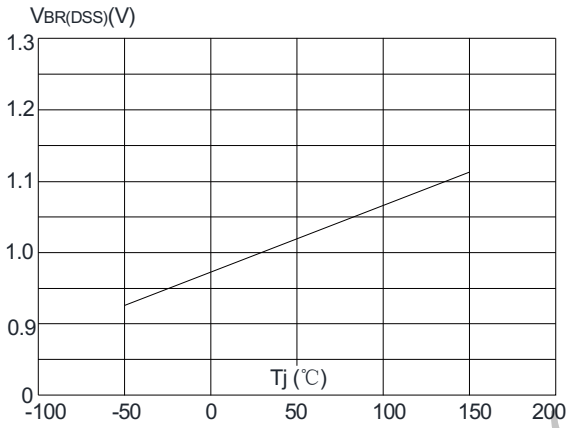


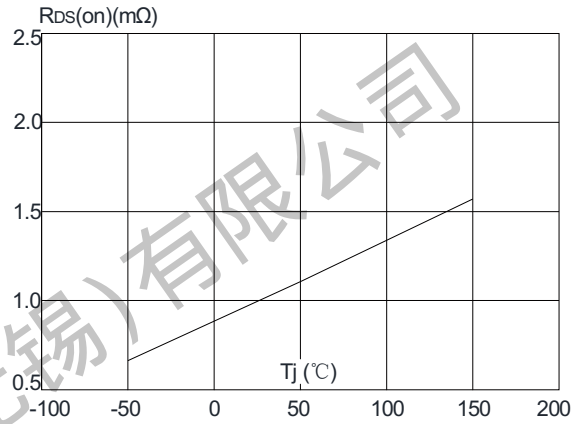
Figure 6: Capacitance Characteristics

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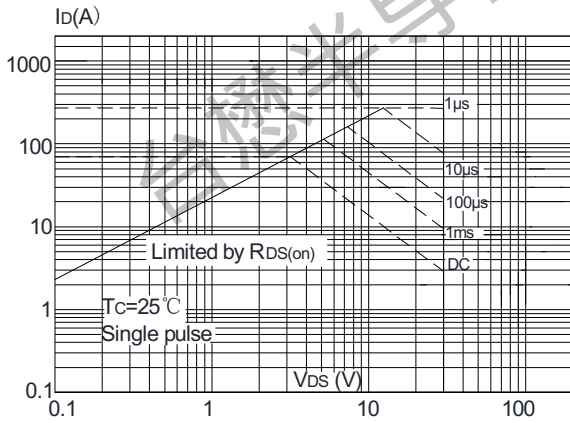
**N+N-Channel Enhancement Mode Mosfet**



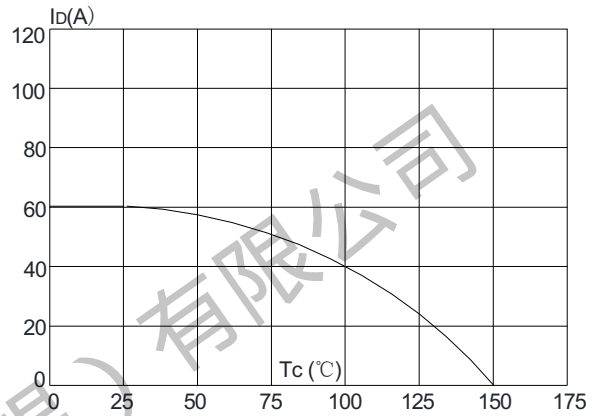
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



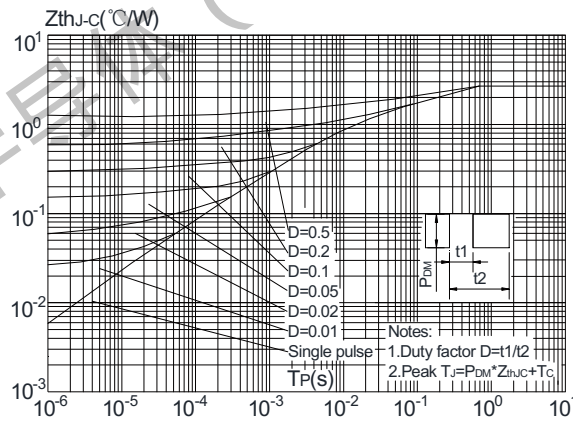
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

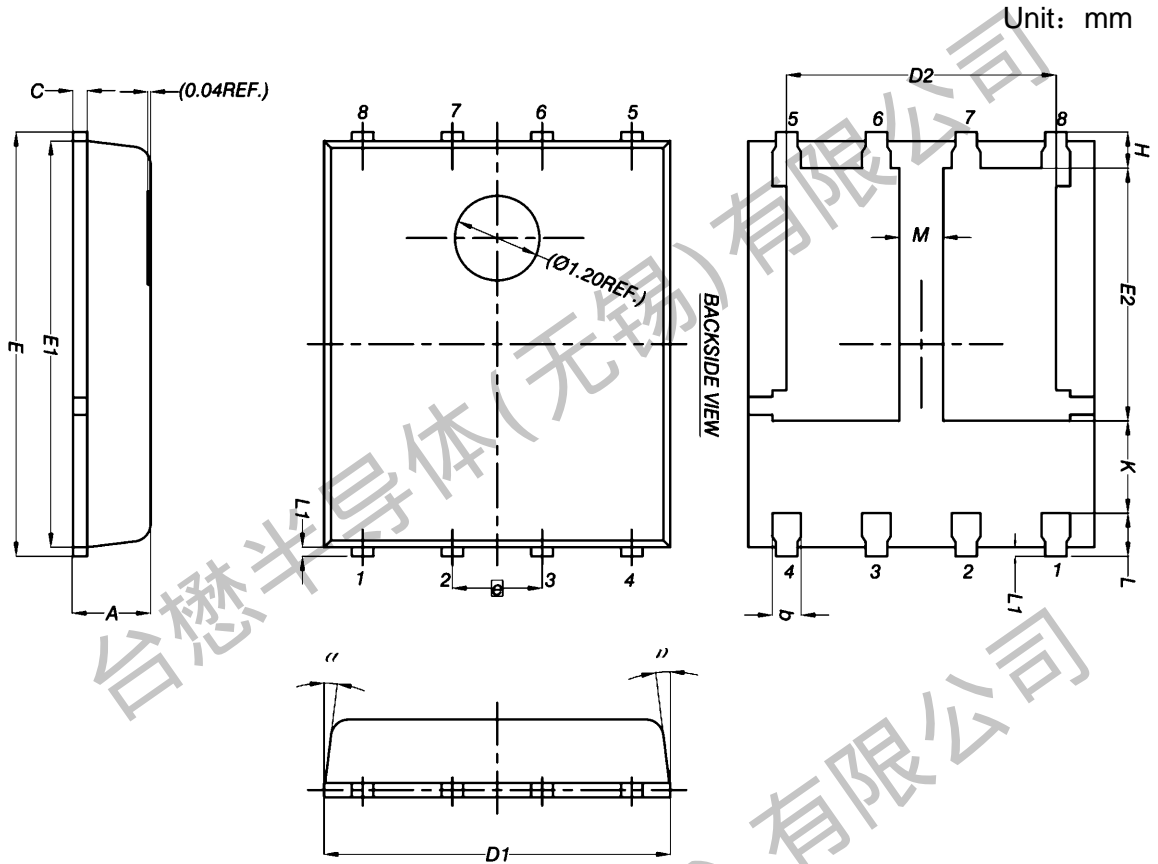


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Package Mechanical Data: DFN5X6-8L

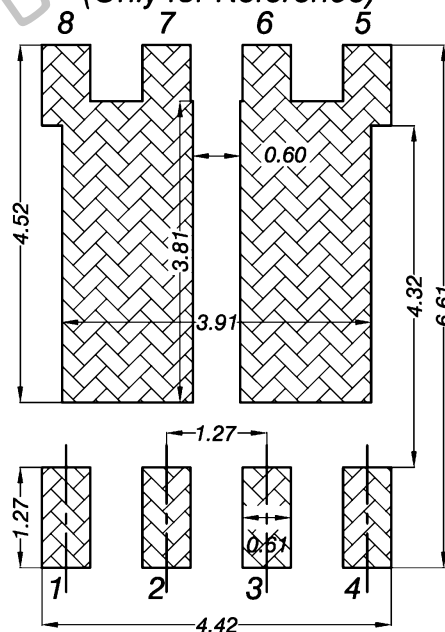


Unit: mm

DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	-	-
α	0°	-	12°

Land Pattern

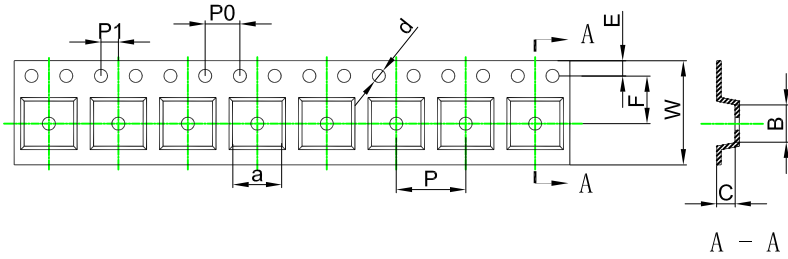
(Only for Reference)



**TM60H03NF**

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PDFN5x6-8L Embossed Carrier Tape

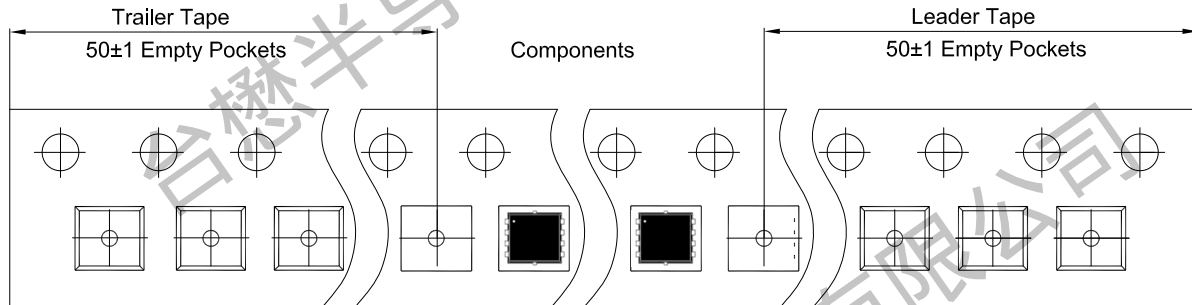


**Packaging Description:**

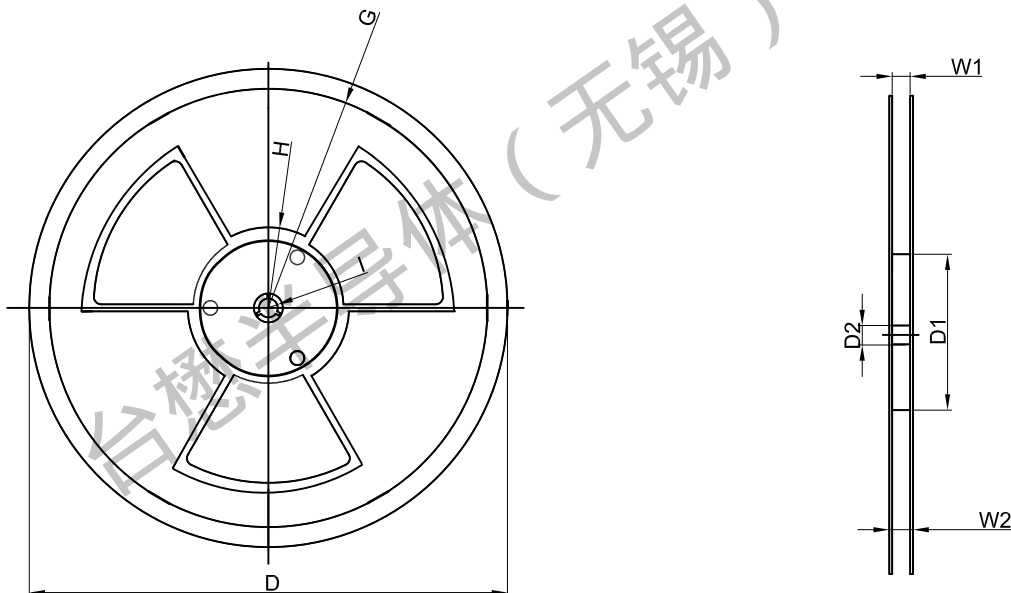
SOP-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).  
**ALL DIM IN mm**

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
PDFN5x6-8L	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN5x6-8L Tape Leader and Trailer



PDFN5x6-8L Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R135.00	R55.00	R6.50	12.00	14.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
5,000 pcs	13 inch	10,000 pcs	370×355×52	50,000 pcs	400×360×368	



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Revision history:

Date	Rev	Description	Page
2023.04.22	23.04	Original	