



ACE2020M

N-Channel 200-V MOSFET

Description

ACE2020M uses advanced trench technology to provide excellent $R_{DS(ON)}$.

This device particularly suits for low voltage application such as power management of desktop computer or notebook computer power management, DC/DC converter.

Features

- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

Applications:

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	12	A
$T_C=25^\circ\text{C}$			
Pulsed Drain Current ^b	I_{DM}	50	A
Continuous Source Current (Diode Conduction) ^a	I_S	47	A
Power Dissipation	P_D	50	W
$T_C=25^\circ\text{C}$			
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Maximum	Unit
Maximum Junction-to-Ambient ^a	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	3	

Notes

- Surface Mounted on 1" x 1" FR4 Board, drain pad using 2 oz copper, value dependent on PC board thermal characteristics.
- Pulse width limited by maximum junction temperature.

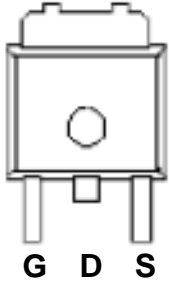


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Packaging Type

TO-252



Ordering information

ACE2020M YM + H

- └─ Halogen - free
- └─ Pb - free
- └─ YM : TO252



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Electrical Characteristics

$T_A=25^{\circ}\text{C}$, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}$			1	uA
		$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^{\circ}\text{C}$			25	
On-State Drain Current	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	24			A
Drain-Source On-Resistance	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 9.6 \text{ A}$			260	m Ω
		$V_{GS} = 5.5 \text{ V}, I_D = 8.3 \text{ A}$			300	
Forward Transconductance	g_{fs}	$V_{DS} = 15 \text{ V}, I_D = 9.6 \text{ A}$		4.4		S
Diode Forward Voltage	V_{SD}	$I_S = 23 \text{ A}, V_{GS} = 0 \text{ V}$		0.95		V
Dynamic						
Total Gate Charge	Q_g	$V_{DS} = 100 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 9.6 \text{ A}$		4		nC
Gate-Source Charge	Q_{gs}			1.7		
Gate-Drain Charge	Q_{gd}			1.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 100 \text{ V}, R_L = 10.55 \Omega, I_D = 9.6 \text{ A},$ $V_{GEN} = 10 \text{ V}, R_{GEN} = 6 \Omega$		10		nS
Rise Time	t_r			8		
Turn-Off Delay Time	$t_{d(off)}$			27		
Fall Time	t_f			13		
Input Capacitance	C_{iss}	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		807		pF
Output Capacitance	C_{oss}			81		
Reverse Transfer Capacitance	C_{rss}			38		

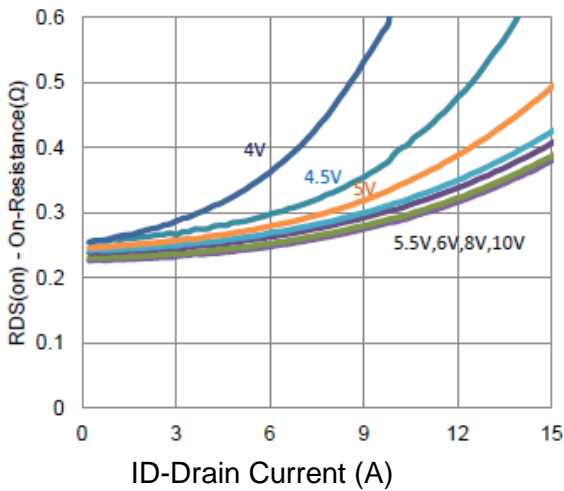
Note:

- Pulse test: $PW \leq 300 \mu\text{s}$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

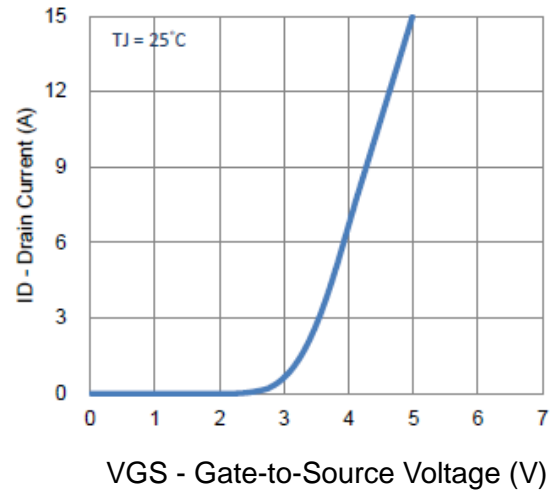


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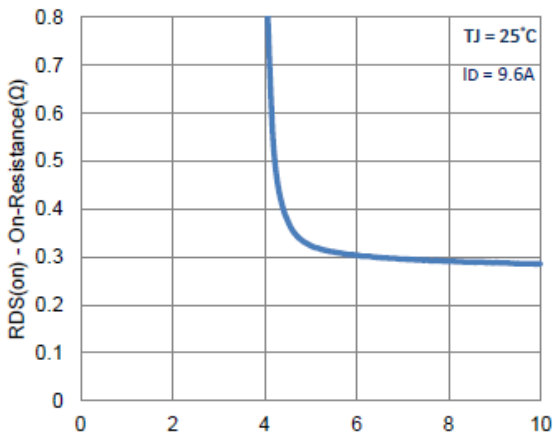
Typical Performance Characteristics (N-Channel)



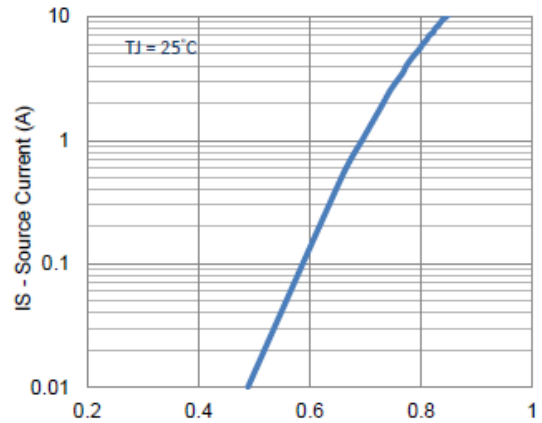
1. On-Resistance vs. Drain Current



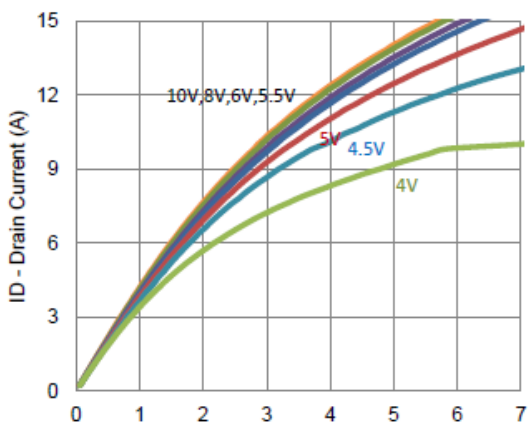
2. Transfer Characteristics



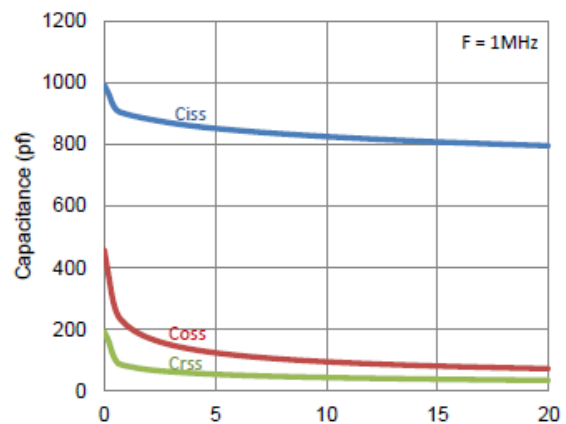
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage



5. Output Characteristics

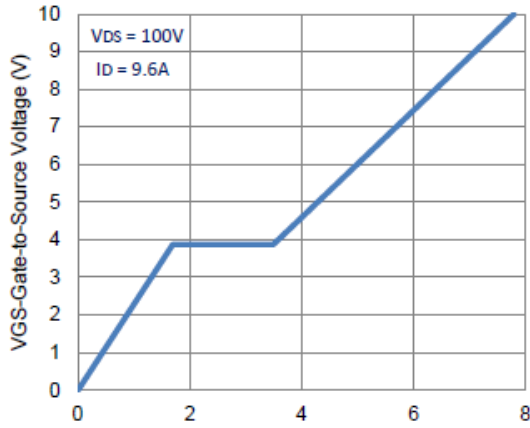


6. Capacitance

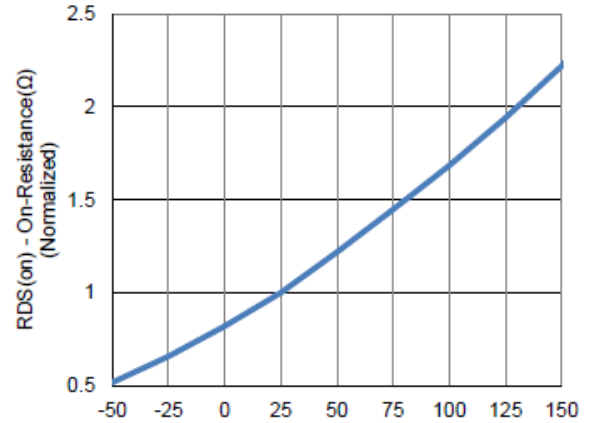


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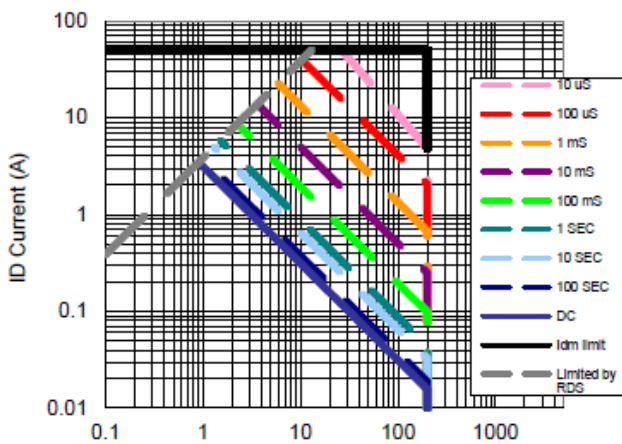
Typical Performance Characteristics



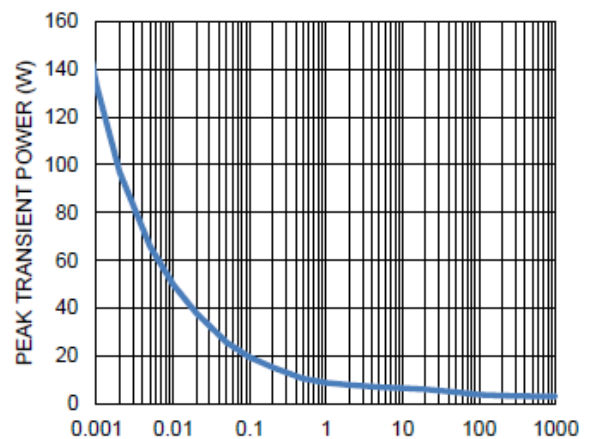
Qg - Total Gate Charge (nC)
7. Gate Charge



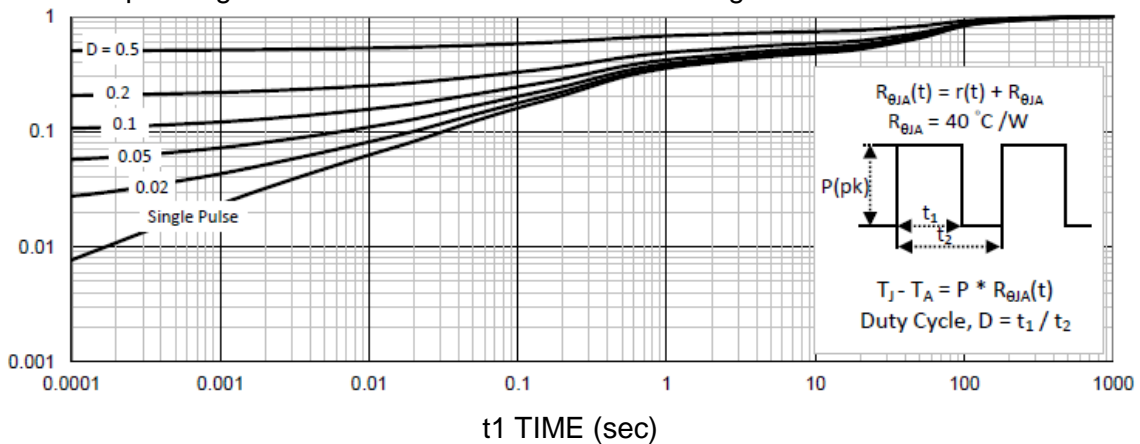
TJ - Junction Temperature(°C)
8. Normalized On-Resistance Vs
Junction Temperature



VDS Drain to Source Voltage (V)
9. Safe Operating Area



t1 TIME (SEC)
10. Single Pulse Maximum Power Dissipation



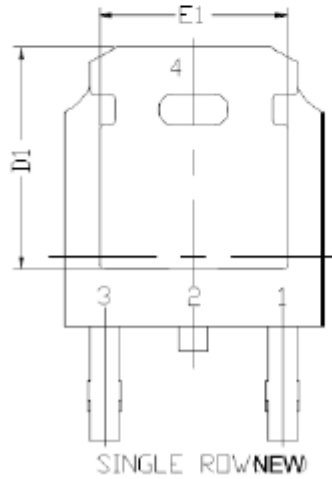
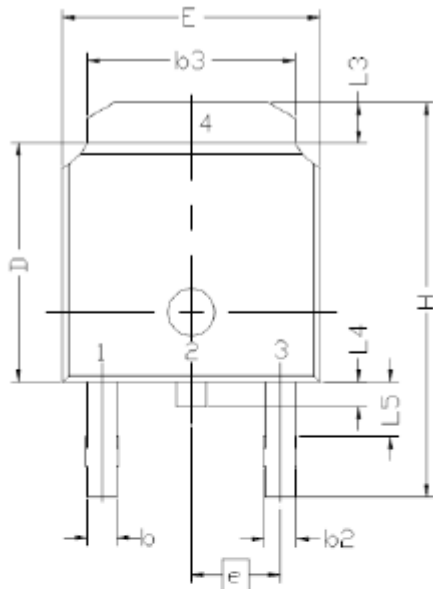
t1 TIME (sec)
11. Normalized Thermal Transient Junction to Ambient



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Packing Information

TO-252



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	6.40	6.60	6.731
L	1.40	1.52	1.77
L1	2.743 REF		
L2	0.508 BSC		
L3	0.89		1.27
L4	0.64		1.01
L5			
D	6.00	6.10	6.223
H	9.40	10.00	10.40
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
e	2.286 BSC		
A	2.20	2.30	2.38
A1	0		0.127
c	0.45	0.50	0.60
c2	0.45	0.50	0.58
D1	5.30		
E1	4.40		
θ	0 °		10 °



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Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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